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IMPLEMENTATION OF A TREATY BANNING CHEMICAL WEAPONS

15 JUNE 1991

IMPLEMENTATION OF A TREATY BANNING CHEMICAL WEAPONS

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The current rolling text (CD 1046), being negotiated in Geneva by the Conference on Disarmament, calls for the establishment of a Technical Secretariat that would ensure compliance by all State Parties to the treaty through an agreed upon inspection regime. This paper takes the status of CD 1046 and analyzes over 40 National Trial Inspections conducted by individual States of both military and civilian facilities that would be affected by the treaty. It establishes the size; composition; proposed, detailed structure and initial cost of this Technical Secretariat. In addition, it provides a cursory look at the responsibilities of the Preparatory Commission to be formed as a part of the implementation process as well as a National Authority to be established by each State Party. A comparison of two inspection regimes is also presented to evidence that financial implications will not be significantly affected.

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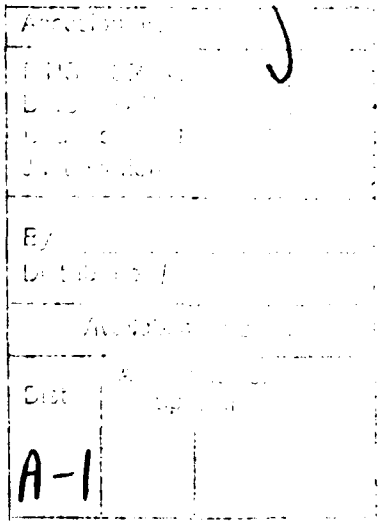

PREFACE

The U. S. Arms Control and Disarmament Agency (ACDA) is responsible for implementing the "Memorandum of Understanding Between the Government of the United States of America and the Government of the Union Of Soviet Socialist Republics Regarding a Bilateral Verification Experiment and Data Exchange Related to Prohibition of Chemical Weapons". To assist ACDA in the accomplishment of this mission, ACDA contracted with EER Systems under Contract DAAH01-90-C-A023 to provide administrative, technical and analytical support for the Phase I visits by US/USSR personnel under this memorandum of understanding (MOU) on chemical weapons and to begin preliminary analysis on the configuration of the "Technical Secretariat", the body that will be responsible for implementing the approved verification and inspection protocol.

During the past twelve months, Soviet delegations visited three chemical munitions storage facilities, two former chemical production facilities, two commercial chemical manufacturing facilities, and a chemical munitions destruction facility in the United States. The seven sites that have been visited by the Soviet delegation, on three separate trips, are: Tooele Army Depot (TEAD), Tooele, Utah; Rocky Mountain Arsenal (RMA), Denver, Colorado; Pueblo Depot Activity (PUDA), Pueblo, Colorado; Johnson Island (JI), Pacific; the Phosphate Development Works (PDW), Muscle Shoals, Alabama; AKZO Chemical, Inc., Charleston, West Virginia; and DuPont Chambers Works, Deepwater, New Jersey. During these visits, EER Systems provided administrative and technical support to ACDA in inspecting and verifying these chemical weapons related sites.

EER Systems was also tasked under Contract DAAH01-90-C-A023 to document the requirements, concerns and inherent technical and procedural risks in establishing a protocol for verification and inspection. The results of EER's analysis on this protocol and the configuration of the "Technical Secretariat" is contained in this report. This report also includes a brief background of the CD as well as a summary of the observations and discussions held between the US and USSR delegation during the visits. Also included is a comparison study of the Swedish Proposal (CD/1053) on verification procedures for the chemical industry as it relates to the rolling text baseline study.

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IMPLEMENTATION OF A TREATY BANNING CHEMICAL WEAPONS

1. BACKGROUND AND INTRODUCTION

1.1 HISTORY OF CHEMICAL WEAPONS RESTRICTIONS

Ever since the first noxious fumes of chlorine gas drifted over the fields near Ypres, Belgium on 22 April 1915, the countries of the world have considered banning the use of weapons of mass destruction; so classified by the United Nations Commission for Conventional Armament in 1948. Chlorine was not the only toxic chemical agent used during World War I. More than 3,000 substances were investigated and from this search came 32 agents that were actually used on the battlefield. Most were lung irritants or choking agents. In 1917, however, the German Army introduced a new type of toxic chemical agent - mustard. In the first three weeks of its use, over 14,000 mustard-poisoning cases were diagnosed and of those, about 500 deaths occurred. It was the greatest single casualty producer of all weapons used, causing 400,000 deaths.

If World War I demonstrated the military value of chemical agents, World War II took it one step further. Although chemical agents were never used, research continued unabated. Tabun, a nerve agent, was discovered by a German industrial research chemist in 1936 while investigating insecticides. Similar research led to the development of two additional nerve agents; sarin, in 1938 and soman, in 1944.

Since World War II, many nations have continued research and development programs in the field of toxic chemical agents. Chemical weapons have been used, or reportedly used, in at least eight locations since 1975, as shown in Figure 1-1. Developments in Southeast Asia and Afghanistan have indicated employment of lethal agents by invading forces. In 1976 reports of the use of lethal chemical weapons began to emerge from Laos. In 1978, similar reports started to come from Kampuchea (Cambodia), and, in 1979, from Afghanistan. Early reports were infrequent and fragmentary because of the remoteness and isolation of the areas. It has also been reported that chemicals were employed in the Iraq-Iran war by Iraq as early as 1981 when Iranian casualties were diagnosed as having mustard burns. Subsequent international teams, under the auspices of the UN, confirmed the use of chemical weapons.

The proliferation of countries developing a chemical warfare capability, and the subsequent use by some of these countries, reflects an ever-growing threat

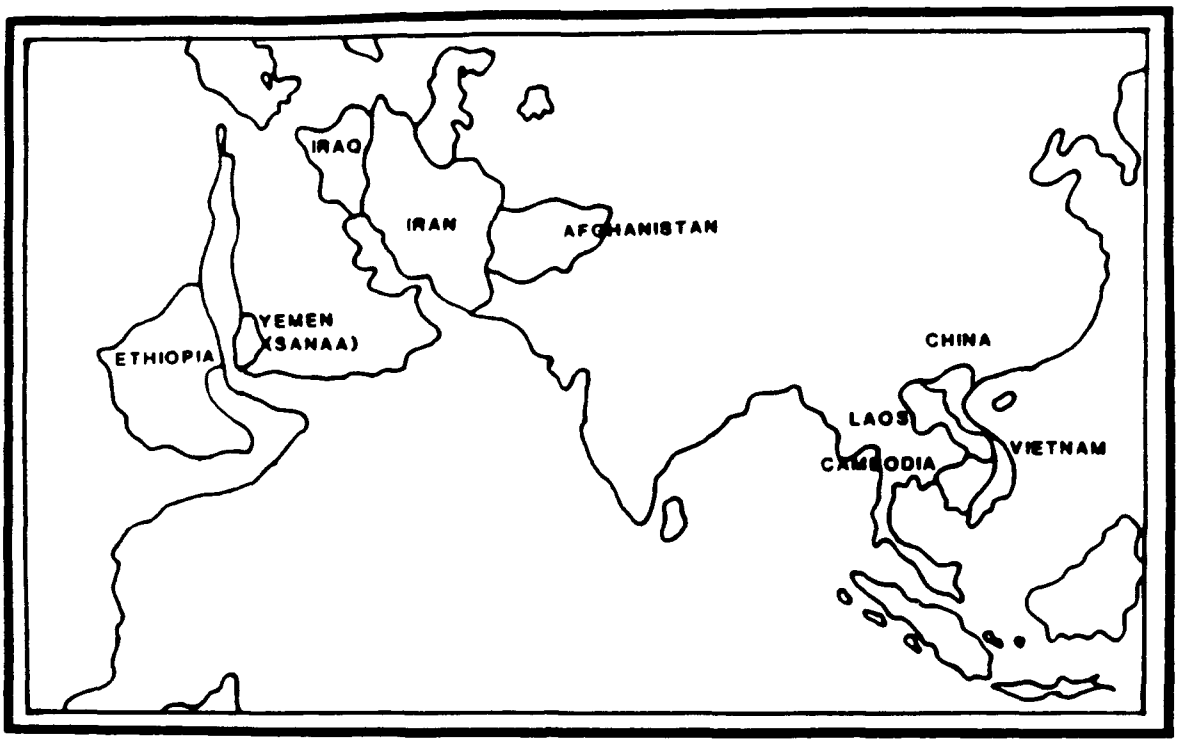

Figure 1-1. Where Chemical Weapons Have Been Used Since 1975

to world peace and stability.

The greatest imbalance between the US and USSR military capabilities is in the area of chemical warfare. Although the United States observed a unilateral freeze on production of chemical agents since 1969 (until limited production of the binary warhead was authorized in 1986), the Soviet Union's production continued unabated. With the passage of time, the freeze has resulted in the US chemical warfare stockpile becoming obsolete and partially unusable.

Other nations are also contributing to the threat. Approximately fifteen to twenty nations may have chemical weapons and some have demonstrated a willingness to use them against real or perceived enemies.

Because of US and USSR declarations, we know that they are possessors of chemical weapons. By virtue of the fact that Iraq has used chemical weapons against Iran, it is also certain that they, too, are possessors. Other countries fall into one of two other categories: strongly suggested, and suspected. The following Table identifies countries which are now confirmed or suspected of possessing a chemical warfare capability. The number in parentheses is an estimation of the number of facilities likely to require inspection.

Table 1-1

Countries Which Are Confirmed or Suspected of Possessing Chemical Weapons

Country	Storage Facilities	Production Facilities	Destruction Facilities
KNOWN:			
Iraq +	(2)	(2)	
USA	9	5	1 *
USSR	(9)	(10)	
TOTAL	20	17	1
STRONGLY SUGGESTED:			
Afghanistan	(1)	(1)	
Burma	(1)	(1)	
China	(1)	(1)	
Egypt	(1)	( )	
Ethiopia	(1)	(1)	
France	(1)	(1)	
Iran	(2)	(1)	
Israel	(2)	(1)	
Libya	(1)		
North Korea	(1)	(1)	
Syria	(1)	(1)	
Taiwan	(1)		
Vietnam	(1)		
TOTAL	15	9	0
SUSPECTED:			
Chile	( )		
Cuba	(1)		
Pakistan	(1)		
Republic of Korea	(1)		
Somalia	(1)		
South Africa	(1)	(1)	
Thailand	(1)	(1)	
TOTAL	6	2	0
GRAND TOTAL	41	28	1

* Constructed and in operational testing
( ) Not confirmed
\+ Now under special UN resolution for monitoring and destruction

Many treaties and protocols have been written and agreed to by various combinations of countries, but the threat of chemical warfare still remains a reality; and the threat is all that is necessary. The first efforts to formally ban chemical weapons (use of poisons and poisoned bullets in war) began with the Brussels Declaration of 1874 and the Hague Conventions of 1899 and 1907. The Treaty of Versailles, and other peace treaties of 1919 and 1920, prohibited the manufacture or import of poisonous gases.

In May 1925, an inter-national arms control conference was convened in Geneva under the League of Nations. It dealt mainly with the export of chemical weapons which many States objected to on the grounds that it favored the States which already possessed them or had production capability. On 17 June 1925, the "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods" was adopted; thus, purportedly, totally banning chemical and biological warfare. It does, however, have its inadequacies. These weaknesses have caused some 40 States to express reservations when ratifying or acceding to it. Examples of these are as follows: First, the Protocol is binding only as regards relations with other parties; and second, the Protocol will cease to be binding in regard to any enemy States whose armed forces or allies do not observe provisions. This means that chemical weapons could be used against non-parties and that if chemical weapons are used, proportional retaliation "in kind" is acceptable.

Between 1925 and the early 1960's, no significant progress was made to strengthen the Geneva Protocol even though violations were reported (Italy, in Abyssinia; and Japan, in China) and allegations made. The large-scale use of herbicides and defoliant agents, as well as the riot control agent (CS) by the United States in Vietnam, brought renewed public attention. As a consequence, the Eighteen-Nation Disarmament Committee (ENDC) placed the chemical warfare issue on its provisional agenda in 1968 under the heading "Non-Nuclear Measures". A group of experts was appointed by the UN Secretary-General to study the effects of chemical and biological weapons. In their report, published in 1969, they described the effects of these weapons on personnel. It urged all States to ratify and adhere to the Geneva Protocol, if they had not already done so. In 1970, the World Health Organization (WHO) report was published on the health aspects of the use of chemical and biological weapons with an emphasis on public health.

President Nixon issued a statement on 25 November 1969 that reaffirmed the renunciation of the first use of lethal chemical weapons and extended this renunciation to the first use of incapacitating chemicals. It also renounced the use of lethal biological agents, confined the US's biological research to defensive measures, and asked DoD to make recommendations as to the disposal of existing stocks. On 14 February 1970, President Nixon renounced the offensive preparations for and the use of toxins as a method of warfare and stated that the US would also confine its military programs for toxins to research for defensive purposes only. On 8 April 1975, President Ford issued Executive Order 11850 which renounced the first use of herbicides in war, except for control of vegetation within US bases or around their immediate defensive perimeters, and first use of riot control agents in war, except in defensive military modes to save lives. This included controlling rioting prisoners of war, using civilian hostages to screen attacks, performing rescue missions in isolated areas, and protecting convoys from terrorist organizations.

During the 1970s, the Conference of the Committee on Disarmament (CCD) and, since 1984, the Conference on Disarmament (CD) has conducted multilateral negotiations on a total ban on chemical weapons. Although chemical weapons were actually employed in the Iran-Iraq war, there had been no hue and cry raised by world leaders until Iraq used them on its own Kurdish population. The Conference on Disarmament is now seriously considering a universal treaty which would ban the production and possession of chemical weapons. This treaty would incorporate inspection and verification provisions. It is this treaty, discussed more fully in the next section, and the requirements for implementation that are the subject of this report.

1.2 CONFERENCE ON DISARMAMENT

1.2.1 Structure of the Multilateral Negotiating Body

Since its inception, the name of the multilateral negotiating body dealing with chemical weapons has changed several times: the Eighteen Nation Disarmament Committee (ENDC), 1962 to 1969; the Conference of the Committee on Disarmament (CCD), 1969 to 1978; Committee on Disarmament, 1978 to 1984; and Conference on Disarmament (CD), 1984 to present. It is the "single, multilateral disarmament negotiating forum" of the international community.

Its membership is limited but can be increased in consultation with the President of the UN General Assembly to ensure universal representation.

Presently, the membership stands at thirty-nine which is aligned into three groups:

Group of 21 (Neutral and Non-Aligned)	Western Group	*Group of Eastern Countries and Others (Eastern Group)
Algeria	Australia	Bulgaria
Argentina	Belgium	Czechoslovakia
Brazil	Canada	Hungary
Myanmar (Burma)	Federal Republic of Germany	Mongolia
Cuba	France	Poland
Egypt	Italy	Rumania
Ethiopia	Japan	Union of Soviet Scoialist Republics
India	Netherlands	
Indonesia	United Kingdom	
Iran	United States of America	
Kenya		* Known before 1990 as the Socialist Group
Mexico		
Morocco		
Nigeria		
Pakistan		
Peru		
Sri Lanka		
Sweden		
Venezuela		
Yugoslavia		
Zaire		

China is a member of the CD but does not belong to any of the three political groups.

Besides regular membership, the CD can grant observer status to non-members who may participate in the various working groups and committees of the Conference. For example, in 1991, observer status was granted to 34 countries including Iraq, North Korea, Libya, Syria and Israel who are considered to be possible possessors of chemical weapons.

The presidency of the CD rotates among the members on a monthly basis. The Conference on Disarmament meets for approximately six months per year (usually in three sessions) in the Palais des Nations in Geneva, Switzerland. It prepares its own agenda and adopts its own rules of procedure, as recommended by the UN General Assembly. The Secretary-General of the Conference is appointed by the Secretary-General of the United Nations and acts as his personal representative.

In March 1980, the CD established an "Ad Hoc Working Group on Chemical Weapons" in order to focus more attention and intensify negotiations. The

chairmanship of this committee alternates among the three political groups. The Ad Hoc Working Group was to concentrate its efforts on the scope of the convention, verification, and other matters. In 1984, the name of the working group was changed to "Ad Hoc Committee on Chemical Weapons". Each year the mandate for the committee must be re-affirmed and may be revised. The scope was extended to include "...conduct, as a priority task the negotiations on a multilateral convention on the complete and effective prohibition of the development, production and stockpiling of chemical weapons and on their destruction, and to ensure the preparation of the convention...to continue the full and complete process of negotiation, developing and working out the convention, except for its final drafting..." (CD/956). During the 1990 session, the words "except for its final drafting" were removed (CD/1033).

The Ad Hoc Committee on Chemical Weapons is usually subdivided into several working groups based on major outstanding issues which change from year to year. Recent working groups have included such topics as: verification, legal and political questions, institutional questions, technical issues, and transition.

1.2.2 The Rolling Text

In a 1984 address to the CD and at the direction of President Reagan, Vice President Bush introduced a draft treaty that the United States would sign. This document became CD/500 and has served, not only as a basis for the US negotiating position, but as the fundamental configuration of the rolling text. The rolling text is the working document of the Ad Hoc Committee on Chemical Weapons. At the end of each session it is updated to encompass all changes, recommendations and preferences of the delegates (by country), and remains the current edition of the non-binding draft Convention on Chemical Weapons.

1.3 BILATERAL US/USSR INITIATIVES

The United States and the Union of Soviet Socialist Republics began bilateral discussions on banning chemical weapons in 1977. In July 1980, these discussions were allowed to lapse and were shifted to the CD. Because of the difficult negotiations experienced within the forty-nation body, the US and USSR (the only two nations to publicly declare possession of chemical weapons) again began a second round of bilateral discussions in 1984, as a compliment to the multilateral negotiations. Following the Reagan-Gorbachev Summit in November 1985 the bilateral discussions on a CW treaty were intensified. Round XVIII was

completed in March 1991. While differences still remain, these bilateral discussions have given impetus to the multilateral negotiations.

Results in the bilateral discussion have been successful with the submission to the CD of agreed-to procedures for inspection of facilities that would have to be declared under the treaty. Also, a paper was developed that outlined the order of destruction for chemical weapons and production facilities that would occur within the initial ten years of treaty implementation. It was subsequently submitted to the CD for consideration and inclusion in the rolling text.

As a confidence-building measure, the US and USSR agreed, in September 1989, to exchange basic data on each other's chemical weapons programs and to exchange visits to a number of CW related facilities. The visits would enable both sides to verify each other's data and further develop verification procedures for inclusion in the multilateral treaty. The data exchange took place on 29 December 1989. The visits began in June 1990 and concluded in February 1991. Sites to be included in the visit schedule were chemical munition storage facilities, chemical weapon production facilities and commercial chemical manufacturing facilities.

1.4 CURRENT STATUS AND PROSPECTS

1.4.1 Multilateral Negotiations

Since 1981, the forty nation (thirty-nine with the reunification of Germany) Conference on Disarmament (CD) has sought to negotiate an effective, global ban on the production, use, storage, and transfer of chemical weapons. With the establishment of the Ad Hoc Committee on Chemical Weapons, it was believed that such a ban could be achieved. During the first three years of discussions, no significant progress was noted. The Geneva summit of 1985 gave renewed impetus to the multilateral process. During 1985, the concept of an international organization to supervise the verification process was introduced.

In 1986, the United Kingdom (UK) introduced a proposal (CD/715) on verification which fostered a position on the "managed access" concept for challenge inspections. Greater attention was given to establishing lists of chemicals for which specific verification measures could be developed. The problem of how to group these chemicals into appropriate categories; i.e., toxicity, purpose, risk; was not resolved. General agreement was reached, however, that all activity at CW production facilities would cease immediately

after the CWC entered into force. The Soviet Union reversed its position and agreed to declare its stockpiles within thirty days after Entry into Force and agreed to also make a timely declaration of its production facilities.

In 1987, with the change of position by the Soviet Union, the attention shifted from military to commercial production facilities and the verification of non-production. It was determined that it was necessary to develop guidelines governing on-site inspections. Unresolved, however, was the problem of how to ensure a balanced destruction of existing stockpiles as well as CW production facilities.

In 1988, the Conference urged countries to conduct "National Trial Inspections" (results were presented during the 1989 and subsequent sessions) and many States (17 in all) complied on a voluntary basis. Further discussion and refinement of the 1987 issues continued but little significant progress was made.

The 1989 session of the CD again made little significant progress. Many issues were discussed but little consensus was reached. Some of the significant issues included:

- composition, procedure, decision-making and powers of the Conference of the States Parties and the Executive Committee to be established under the Chemical Weapons Convention (CWC);
- Annex on Chemicals be developed which would contain the technical details that were presently included in various Articles of the rolling text (contained in Appendix A of this document);
- adoption of a fourth Schedule to contain lethal chemicals which could be used for CW but are not presently used for that purpose (The initiative was eventually dropped in favor of a Schedule 2B; refer to Appendix A.);
- protocols on inspection procedures; and
- political issues; i.e., relation of the projected CWC to the Geneva Protocol, the order of destruction of CW stockpiles and production facilities, and on-site inspections.

1.4.2 Bilateral Negotiations

During the eighth round of bilateral talks (1988), the US and USSR agreed to a common approach to the elimination of CW production facilities. This included a definition of a CW production facility as well as the conclusion that these facilities could not be converted to peaceful use but must be destroyed.

In 1989, based on the INF experience, the US and USSR agreed to establish a detailed set of procedures for on-site, challenge inspections. They also agreed to a procedure on the leveling out of stockpiles by the eighth year of the ten-year destruction period. The US raised the issue of "limited production" of CW even after a multilateral treaty has entered into force (previously submitted by France in 1987 as a limited "security stockpile").

In December 1989, the US and USSR agreed to discuss a proposed bilateral accord on an 80% reduction of CW stockpiles at the next summit meeting. President Bush also offered to cease modernization (binary weapons production) if the Soviet Union would accept his proposal made in September 1989 before the UN General Assembly. These positions are contained in the US/USSR agreement signed by Presidents Bush and Gorbachev in June 1990; congressional action on this agreement is pending.

1.4.3 Unresolved Areas of Concern

The following is a representative sample of unresolved problem areas. They are presented here to give the reader an appreciation for the convoluted and complex nature of the issues as well as a feel for the various national positions.

- Proliferation. Although only two countries (the Soviet Union and the United States) have officially declared possession of chemical weapons, it is estimated that ten to twenty other countries possess chemical weapons or the capability to produce chemical weapons. Unless the weapons are used; i.e., it is certain that Iraq has CW since they used it against Iran; however, it is difficult to prove possession due to the lack of verification procedures. During the war over Kuwait in February 1991, Iraq declined to use its chemical weapons arsenal and; in response to the UN Security Council resolution 687, paragraphs 7 to 12; declared that most production sites were destroyed. One measure of stemming proliferation is by applying strict export controls to chemical agents and precursors. The Australia Group has developed a list of forty chemicals, of which nine are prime, that should be rigidly controlled. The list is distributed to the commercial chemical companies in order to elicit their cooperation. This type of control is regarded as discriminatory by developing countries. It locks them into a compromising situation where some countries have CW capability and they cannot acquire it. Some emerging countries have even gone so far as to

demand CW technology as their deterrence against nuclear weapons since they do not have, nor probably ever will have, nuclear capability.

Secretary Baker has proposed to the USSR that non-proliferation be the top arms control agenda item for the 1990's (Sept. 90).

- Verification Procedures. The definition of verification procedures is still incomplete and questions remain. Is each country's declaration accurate in the first place? How much verification is enough? Will the inspections be used to gather intelligence unrelated to the CWC? How can the loss of confidential proprietary information be compensated or controlled? The Geneva Protocol does not provide for any verification procedures. However, in August 1988, Resolution S/620 was adopted which gave the UN Secretary-General authority to conduct fact-finding missions in cases of alleged CW use.

- Misuse of the Chemical Industry. The Eastern Group has proposed banning the production of all methylphosphorous compounds (basis for nerve agents). The Western countries rejected this on the grounds that it would cripple commercial production for peaceful purposes and create a "graveyard" of chemicals on which no research could be performed. The fact remains that, theoretically, the chemical industry could produce CW agents. The Board of Directors of the US Chemical Manufacturers Association (CMA) fully backs the CWC and has expressed its willingness to comply with all verification measures providing that confidential commercial information be protected. Chemical industries in other Western countries have also expressed support for the CWC.

- Geneva Protocol. Under the Protocol, forty States reserved the right to retaliate in kind if CW was used against them. Some countries argue that this provision is diametrically opposed to the intention of the CWC. Others feel that these exceptions to the Protocol could be maintained.

- Challenge Inspections. "Anytime, anywhere, no right of refusal" could be abused by self-seeking governments/organizations for political or industrial espionage. The UK has identified a wide range of managed access techniques for dealing with the security concerns while still enabling a good deal of information to be made available to inspectors. The techniques were divided into routine managed access measures for use at most sites and exceptional measures for sites where particularly sensitive security concerns were at stake. These measures include Random Selective Access. The UK found that Random Selective Access was a major contribution to aleviating security

concerns while still giving an inspection team sufficient access to enable them to conclude, with a high degree of confidence, that the location or item subject to managed access was unrelated to chemical weapons and posed no threat to the CWC.

- Enforcement. The problem of how to discipline violators of the Convention remains undefined.

- Jurisdiction. It is not difficult to find multinational enterprises having manufacturing facilities or affiliates in other countries. In fact, it is standard business practice to establish subsidiary organizations in "less costly" or "less restrictive" environments. Under whose auspices would they come with regard to the Convention? Who would be responsible: the country in which the headquarters is located (which may be a Party to the convention) or the host country (which may not be a Party to the Convention)? A related issue concerns old stockpiles of chemical weapons that were left in occupied countries during World War II.

1.5 SCOPE AND ORGANIZATION OF THE CHEMICAL WEAPONS CONVENTION (CWC)

1.5.1 Scope. In essence, the projected CWC will expand the scope of the Geneva Protocol. At present, the Protocol prohibits the "use of asphyxiating, poisonous, and other gases" and of all analogous liquids, materials or devices in war. The aim of the Convention is to extend this prohibition to include the development, production, acquisition, stockpiling or transfer of these weapons and further bars States Parties from assisting, encouraging or inducing anyone to engage in these activities.

To assure achievement of these goals, the CWC will subject an entire commercial industry, worldwide, to in-depth monitoring.

The CD has arrived at a point in its negotiations that will require delegations to develop, in accordance with Article VIII of the draft treaty, the structure of the organization that will be tasked to fulfill the responsibilities of the verification regime to ensure treaty compliance by all States Parties that sign and ratify the treaty. Specific U.S. objectives for the verification organization are to ensure that:

- sound procedures are established for inspecting and verifying declared and undeclared chemical weapons stockpiles and production facilities;

- the Technical Secretariat is adequately manned and funded to accomplish its mission; and

- the costs to operate the Technical Secretariat are divided among the States Parties in an equitable manner.

1.5.2 Structure. While specific details of the organizational structure have not been agreed upon, the general structure envisioned by the Convention is shown in Figure 1-2. Some outstanding issues which need to be addressed are:

- the relationship between the Organization and the United Nations (Most States Parties agree there should be some bond between the two but also that the Organization should be autonomous.);
- location of the headquarters; and
- financial support (Should States, who do not possess chemical weapons be required to contribute to the monitoring of the destruction of chemical stockpiles and production facilities?).

A Preparatory Commission will be established to prepare for the effective operation of the Convention from the time of its Entry into Force. It is currently proposed that the Preparatory Commission be composed of all States which sign the Convention before its Entry into Force. It will remain in existence until the first session of the Conference of the States Parties has convened. At that time, all property and records will be transferred to the Organization.

1.5.2.1 The Conference of the States Parties (CSP). "The Conference of the States Parties shall be composed of all the States Parties to this Convention. Each State Party shall have one representative in the CSP, who may be accompanied by alternates and advisors." The CSP will meet in regular session once a year, unless otherwise decided, beginning thirty days after the Entry into Force of the Convention (location to be determined). It will adopt its own rules of procedure and, at the beginning of each session, elect its Chairman. The CSP will make decisions on all questions of procedure related to the Convention, and will define an annual budget. Subsidiary bodies have been proposed but their definition has not been determined.

- Fact-Finding Panel (U.S. proposition) consisting of diplomatic representatives of five Parties to the treaty (inclusive of US and USSR) to act as political screeners for requests for challenge inspections.
- Technical Training Body (Eastern Group proposition) to train personnel in standard international verification techniques and use of equipment.

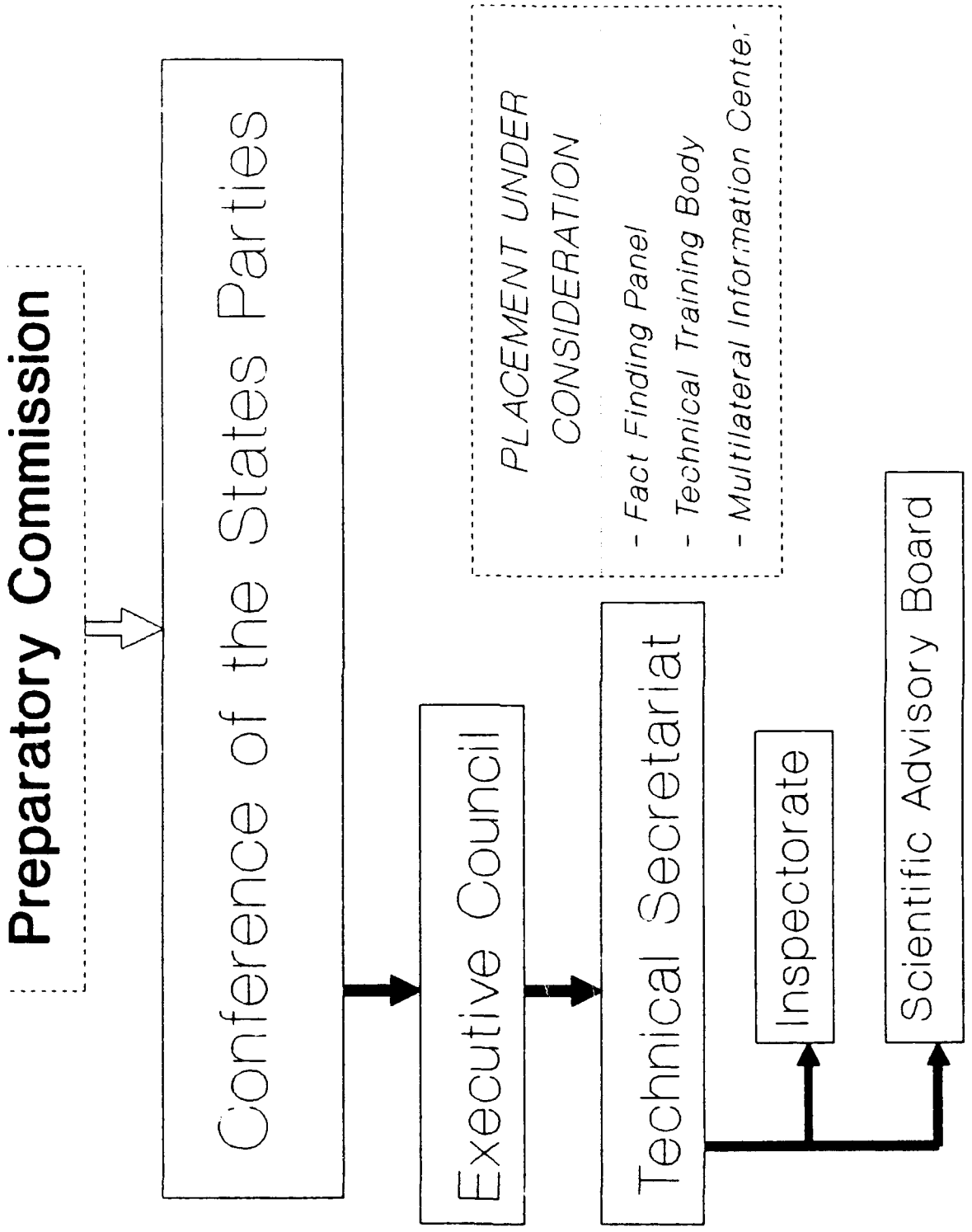

Figure 1-2. Preliminary, Operating Structure of the Chemical Weapons Convention

• Multilateral Information Center (Austrian proposition) to assist the Parties in setting up national export control systems, exchange of information, and providing information on disruptions of export controls.

1.5.2.2 The Executive Council (EC). "The Executive Council will be the executive organ of the Conference of States Parties, to which it will be responsible." It will supervise the day-to-day business of the Organization in consonance with the recommendations and guidelines established by the CSP. Activities will include:

- promoting implementation of and compliance with the Convention;
- supervising the Technical Secretariat;
- facilitating cooperation among States Parties at their request;
- considering any issue affecting the Convention and its implementation;
- submitting the draft budget of the Organization to the CSP;
- submitting the draft report on the implementation of the Convention to the CSP; and
- establishing operating procedures for the organization.

1.5.2.3 The Technical Secretariat (TS). The Technical Secretariat will be responsible for the implementation of the CWC to assure the States Parties that all provisions are being followed. The TS will be composed of a Director-General (chief administrative officer), inspectors, and other scientific and technical personnel as required. The Director-General will be appointed by the CSP, upon the recommendation of the EC, and will be responsible for the selection of staff, and the organization and function of the TS. The TS will carry out the assigned functions under the Convention as well as actions directed by the CSP and EC. These consist of:

- corresponding on behalf of the Organization with States Parties related to Convention implementation;
- negotiating subsidiary agreements with States Parties concerning on-site verification upon approval by the EC;
- executing international verification measures;
- establishing a Scientific Advisory Board of experts to provide recommendations on specific issues;
- informing the EC of any problems with regard to the execution of its functions;

- providing technical assistance and evaluation to States Parties;
- submitting draft reports on implementation of the Convention to the EC;
- submitting draft budget requests of the Organization to the EC; and
- providing administrative and technical support to the EC and CSP.

Implementation of the Technical Secretariat will be discussed in more detail in Sections 3 thru 5.

2. DECLARATION OF FACILITIES SUBJECT TO INSPECTION

As mentioned earlier, the US and USSR are the only two countries to have formally declared CW capability. US declared sites can be found on Figure 2-1 and are as follows:

SITE	LOCATION
Aberdeen Proving Ground (APG) (Includes Edgewood Arsenal)	Aberdeen, Maryland
Anniston Army Depot (ANAD)	Anniston, Alabama
Johnston Island (JI)	Johnston Island, Pacific
Lexington-Blue Grass Army Depot (LBAD)	Richmond, Kentucky
Newport Army Ammunition Plant (NAAP)	Newport, Indiana
Phosphate Development Works (PDW)	Muscle Shoals, Alabama
Pine Bluff Arsenal (PBA)	Jefferson County, Arkansas
Pueblo Depot Activity (PUDA)	Pueblo, Colorado
Rocky Mountain Arsenal (RMA)	Denver, Colorado
Tooele Army Depot (TEAD)	Tooele, Utah
Umatilla Army Depot Activity (UMDA)	Hermiston, Oregon

2.1 CHEMICAL WEAPONS PRODUCTION FACILITIES

Each State Party, within thirty days after the Convention enters into force for it, will submit a declaration (as relates to facilities in use since 1 January 1946) as to location, transfer or receipt of production equipment, facilities closure plan, facilities destruction plan, and/or plan for the temporary conversion of any production facility to a destruction facility. Also, no State Party will construct a new facility or modify an existing facility for the production of chemical weapons. All activity, except to assure safety and prevent environmental damage, at existing facilities shall cease immediately. Each State Party will also provide immediate access to these facilities for the purpose of a systematic, international, on-site verification of the declaration. For a listing of chemicals whose production is prohibited refer to Appendix A.

Initial inspections of chemical weapons production facilities will be conducted to verify the declaration and to assure that all production activities have ceased. Subsequent inspections, possibly supplemented by on-site monitoring, will be used to assure that production is not resumed. Annually, after the CWC enters into force, States Parties having production facilities, must submit plans for the scheduled distruction of these facilities. The inspection activities will: verify the acceptability of these plans under the CWC, periodically monitor the process of dismantling and destroying the facility, and certify to the Technical Secretariat the final closure and destruction of the

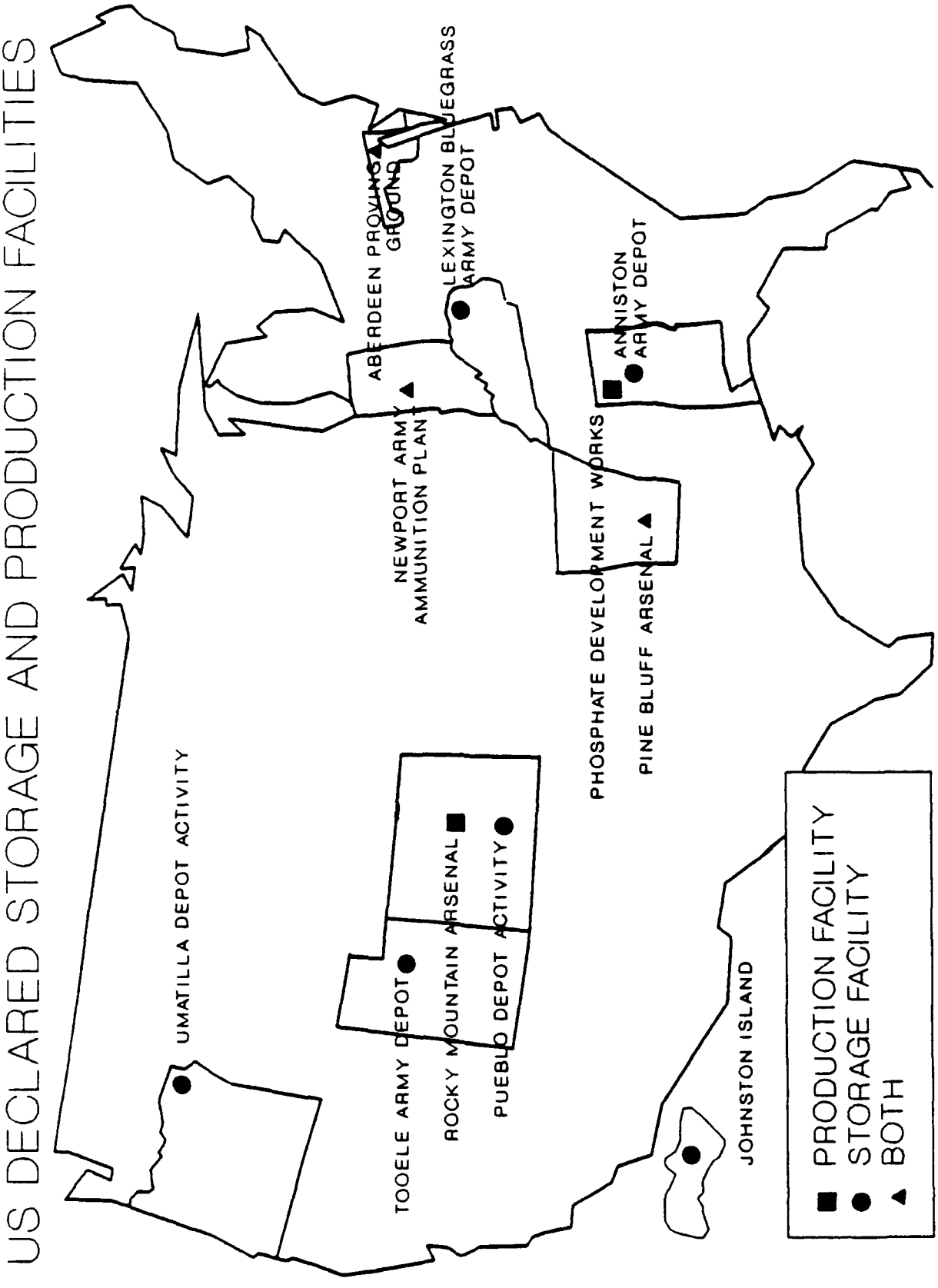

Figure 2-1. U.S. Declared Storage and Production Facilities

facility. Destruction of all production facilities must be completed within ten years after Entry into Force.

2.2 MUNITIONS STORAGE SITES

Each State Party, within thirty days after the Convention enters into force for it, will submit a declaration containing precise location, quantity and detailed inventory of the existing stockpile; reports on chemical weapons on its territory but under the jurisdiction of others; transfer or receipt (since 1 January 1946) of chemical weapons; and a plan for their destruction. Each State Party will submit, within six months after Entry into Force, detailed plans for the destruction of chemical weapons as well as cooperate with other States Parties that request information or technical assistance in developing safe and efficient destruction procedures. Destruction must begin within twelve months. Each State Party must provide immediate access to its storage facilities for the purpose of a systematic, international, on-site verifica-tion of the declaration.

Munitions Storage Facilities will be subject to periodic inspection by the Technical Secretariat. Initial inspection will verify the accuracy of the State Parties' declaration by inventorying the munitions present and conducting (or observing) such sampling as necessary to verify the qualitative aspects of the declaration (i.e., agent type). A combination of periodic inspections, on-site monitoring, and perimeter controls will be used to provide assurance that the munitions are not removed or diverted prior to their destruction. A final inspection will verify the complete destruction of the munitions stockpile and will permit the facility to enter an unmonitored status.

2.3 COMMERCIAL CHEMICAL MANUFACTURERS (SCHEDULE 2A, 2B, AND 3)

Although commercial chemical facilities are not specifically delineated in the Convention, they are, by virtue of the fact that they produce Schedule 2 or 3 chemicals, included under its provisions. Each State Party, within thirty days after the Convention enters into force for it, will declare production data on relevant chemicals (Schedule 1, 2A, 2B, and 3) and the facilities that produce them. This requirement is not meant to hamper, in any way, the economic or technological development of peaceful chemical activities. Whereas facilities will be required to grant the Inspectors access, the verification must avoid undue intrusion into their peaceful activities and take all necessary steps to avoid compromising confidential business information.

A variety of inspections will be used to verify the initial (and updated)

declaration by the States Parties and to provide assurance that undeclared production of chemical warfare materials is not occurring at commercial chemical manufacturing facilities. The declaration of each State Party will be reviewed for accuracy and completeness by the Technical Secretariat using national and international trade and economic data. Inspectors will visit each declared producer of Schedule 2 chemicals, producing over one ton/year (not yet agreed to), and will examine the facility records system and the production, storage and shipment operations and equipment. During the initial inspection, a facility agreement between the chemical company and the Organization will have to be negotiated. Subsequent inspections and the use of on-site monitoring equipment will provide the Conference assurance that no undeclared production and no diversion of critical chemicals to chemical weapons production occurs. The CWC anticipates that the inspection and monitoring of declared chemical manufacturing operations will continue indefinitely.

In the case of chemical manufacturing facilities producing Schedule 3 products or having the capability to produce critical chemical weapons materials, the situation with regard to inspection is less clear. This type of facility must be reported in the initial and annual declarations made by each State Party to the CWC. Current thinking appears to be that Schedule 3 chemical producers of greater than 30 tons/year (not yet agreed to) and chemical weapons capable plants may be subjected to random (ad hoc) inspections. All facilities of this type must be identified in the national declaration. The objectives of these inspections would be similar to those for the Schedule 2 chemical manufacturers discussed above. These inspections would, however, be less frequent and would not be repeated on a regular schedule. Since there are a large number of commercial chemical manufacturing facilities in this class, decisions regarding the number, frequency, and type of inspections will have a large impact on the amount of resources required by the Technical Secretariat.

2.4 CHEMICAL WEAPONS DEMILITARIZATION FACILITIES

"Destruction of chemical weapons means a process by which chemicals are converted, in an essentially irreversible way, to a form unsuitable for production of chemical weapons and, which in an irreversible manner, renders munitions and other devices unusable as such." All chemical weapons will be destroyed at a pre-designated site(s) beginning within one year of the Entry into Force for that States Party and ending no more than ten years later. The

destruction can take place at a faster rate if so desired. Each State Party will provide access to any destruction facility while destruction activities are taking place. The Technical Secretariat must be notified in advance (14 days is recommended) of any destruction operations or transport of munitions to a destruction site. Inspectors will be present during all phases of the destruction process. Cargo will be sealed by the Inspectors at the point of departure and verified at the point of arrival to certify the complete destruction of the declared stockpile. Although US law requires the elimination of the destruction facility, no provision in the CWC is made for the dismantling of the destruction facility once all CW have been eliminated.

In addition to inspections of the plans for and construction of chemical munitions destruction facilities, the current draft of the CWC envisions the continuous presence of international inspectors during destruction operations. These inspectors would verify the number of munitions destroyed so that progress in destroying the chemical stockpiles can be monitored and, ultimately, the elimination of these stockpiles can be assured. In addition to on-site inspection of the destruction facility and operations, the use of monitoring equipment is envisioned by the CWC.

2.5 OTHER CW FACILITIES

In addition to the above facility types, the CWC will require reporting and inspection of other facilities operated by the States Parties.

Facilities which permit chemical research and development (for defensive purposes) and produce more than 100 grams/year not to exceed 10Kg/year of Schedule 1 chemicals, must be declared and are subject to inspection.

Also, each State Party is permitted a Single Small-Scale Facility (SSSF) for the production of Schedule 1 materials. Production cannot exceed one ton of chemicals per year and a strict accounting must be made of the production and use of these chemicals. Both on-site inspection and unattended monitoring equipment may be used at the SSSF.

2.6 PROPOSED MODIFICATIONS

In the most recent session of the CD, a proposal was made by Sweden (CD/1053) to revise the pattern of verification activities, both declarations and inspections, as reguards commercial manufacturing facilities. This proposal would expand the number of facilities which must be declared by defining a set chemical processes (a Schedule 4) which, if they are implemented above a

specified size or capacity, would require the declaration of the facilities even in the absence of current or planned production of chemicals on CWC Schedules 1, 2, or 3. For specific processes refer to Appendix B.

The concept behind this proposed addition of a Schedule 4 is that facilities which possess equipment to perform one or more of these processes could easily produce CWC Schedule chemicals. By requiring the declaration of these facilities and subjecting them to possible verification inspection, the original proposal attempts to provide a more complete coverage of possible threats to the objectives of the Convention.

The Swedish Proposal also would eliminate the routine, periodic inspections of Schedule 2 producers and instead subject all declared facilities (Schedule 2, 3 and 4 facilities employing the above processes) to a regime of inspections requested by States Parties and, in some cases, selected randomly by the Technical Secretariat.

The Swedish Proposal remains to be considered by the CD. The implications of this proposed verfication regime, in terms of Technical Secretariat staffing and costs, are examined in Section 8 of this report.

3. REQUIREMENTS FOR IMPLEMENTATION OF THE TECHNICAL SECRETARIAT

3.1 DEFINITION

The Technical Secretariat, as agreed to in Article VIII of CD/1033, is the operating arm of the international structure to be established to carry out the provisions of the Chemical Weapons Convention (CWC). Activities of the Technical Secretariat will be wide-ranging and will be funded by the States Parties to the CWC according to an apportioning formula to be determined.

The specific responsibilities, as can best be determined, of the Technical Secretariat and the activities required by these responsibilities are shown in Table 3-1. The scope or resource requirements, also shown, are order-of-magnitude estimates. The following section discusses the factors that determine the resources required to implement the Technical Secretariat to include staffing, equipment, and facility needs.

3.2 RESOURCES AND COSTS

3.2.1 Summary of Cost Uncertainties. The analysis of Technical Secretariat costs reveals three major uncertainties which need to be further defined if precise and reliable cost estimates are to be prepared.

First and foremost, the procedures to be used during on-site inspection must be specifically defined for each type of facility to be inspected. The size (and composition) of the inspection team, the duration and frequency of the inspections, and the analytic support required by the inspectors are all critically dependent on the procedures employed. The National Trail Inspections and US/USSR bilateral exchanges (see Appendix B) are providing information from which to define specific procedures. Inspection procedures are necessary to the production of realistic, defendable cost estimates.

Several countries, participants in the Conference on Disarmament (CD), have conducted National Trial Inspections (NTIs) of military and commercial facilities which would be subject to inspection under the terms of the projected CWC. These NTIs were intended to examine the characteristics of various types of inspections and define the scope of the required effort. Table 3-2 lists the characteristics of the NTIs which have been reported to the CD.

Results of these NTIs have been considered in the preparation of the staffing and cost estimates presented in this document. It should be noted that the NTIs have involved only citizens of the state conducting the trial. The TS international team would require more detailed inspection procedures and support

Table 3-1
RESPONSIBILITIES AND ACTIVITIES OF THE TECHNICAL SECRETARIAT

CWC Article	Responsibilities	Required Activities	Estimate of Scope or Level-of-Effort
III Declarations	• Receive, analyze and report on declarations submitted; initial and annual	• Analyze submissions (use other sources to crosscheck) • Annual report to EC and Conference of States Parties • *Plan and report on inspection activities*	• Continuing effort • One to three staff months per declaration • About ten staff required assuming 50 states parties
IV Chemical Weapons Declaration, Destruction	• Receive and verify declaration regarding chemical weapons and their destruction	• Conduct initial and periodic inspection of CW stockpiles • Verify CW destruction	• 50 on-site inspector days per stockpile location in first year; 25 on-site inspector days therefore • Dedicated team of inspectors for each destruction facility for duration of program; 10-20 man team depending on number of shifts worked
V Production Facilities Declaration, Closure, Destruction	• Provide assurance of non-production and destruction of declared production facilities	• Conduct initial and periodic inspection of declared production facilities	• 25 on-site inspector days per declared facility in initial year; 10-15 days in following years
VI Activities not Prohibited	• Review and report on declarations concerning production of Schedule 2 and 3 chemicals • Inspect and verify declarations • Monitor permitted (SSSF*) production	• Report on declarations • Conduct initial and periodic inspections of declared facilities • Inspect (annually) SSSF • Negotiate facility agreements	• 5 staff (assuming one man-month per State Party declaration) • 25 on-site inspector days per Schedule 2 facility per year • Low-level (but undefined) effort for Schedule 3 and other chemical production facilities • 10-20 on-site inspector days per SSSF per year
IX Consultations, Cooperation Fact-Finding	• Provide technical expertise • Conduct and report on challenge inspections	• Conduct and report on challenge inspections • Investigate allegations of CW use	• Dependent on the number and type of challenge inspections • Allegation of use may require use of individuals (expertise) outside of Technical Secretariat staff
X Protection Against Chemical Weapons	• Respond to requests for information and assistance	• Provide available technical information • Coordinate with various National Authorities	• Dependent on number and type of requests • Requires coordination with responding National Authorities
XI Economic and Technological Development	• Respond to requests for information and assistance	• Provide available technical information • Coordinate with various National Authorities	• Dependent on number and type of requests • Requires coordination with responding National Authorities

* SSSF = Single, Small Scale Facility

activities; e.g., translation and interpretation services.

Secondly, the equipment for on-site inspections and facility monitoring needs to be defined. Available equipment is closely tied to inspection procedures, therefore, these issues must be addressed together. One approach

Table 3-2: U.S. Arms Control and Disarmament Agency
Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE		OFF-SITE	
												Facility	Inspector		
MILITARY GOVERNMENT FACILITIES															
Military Facility (Challenge	UK (WP.245) (10/88)	Yes Yes	5 5	2 2						✓					1) Managed access procedures 2) Primary visual; considered on-site analysis 3) Larger team required to secure site 4) Break into 2 teams to cover area
Military Facility (Challenge) Storage	USSR (WP.275) (5/89)	Yes	20	5						✓ Air					1) Inspection report should contain minimum information 2) Interviews and documentation used to establish confidence 3) Labor-intensive; 4 subgroups used 4) Facility documentation important
Military Facility (Challenge)	FRG (WP.283) (11/89)	No	8	1						✓			✓ (MS) (Radio-Meter)		1) Demonstration of non-destructive weapons assessment 2) Broad role for observer 3) 24 hrs insufficient to establish compliance
Military Facility (Challenge) Storage	UK (WP.304) (9/89 to 4/90)	Yes (Larger team req)	Unk (4+)	2						✓			✓	✓	1) Need equipment/techniques to identify CW 2) Use of managed access; preplanned by inspected facility 3) Team size and duration dependent on site size
Military Facility (Challenge)	Nether-lands (WP.307) (3/90)	Yes	5	1						✓				✓	1) Inspector analytic equipment was considered but not demonstrated 2) Managed access procedures tested
Military Facility (Challenge)	GDR (WP.310) (3/90)	Yes	10	1											1) Visual examination of munitions storage areas 2) Sampling not required to demonstrate compliance
Military Facility (Challenge) Storage	Czecho-slovakia (WP.312) (7/90)	Yes	12	1	✓					✓			✓		1) Records used with visual inspection 2) Detector tubes for sample analysis 3) Importance of preparation and training

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Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE		OFF-SITE	
												Facility	Inspector		
Military Facility (Challenge)	France (WP.318) (6/90)	Yes	9	2						✓	✓			✓	1) Munitions examination by gamma radiography 2) CW detectors used on-site 3) Role of observer needs definition
Military Depot (Challenge)	FRG (WP.278) (8/89)	Yes (Large team necessary)	5	≈1				✓ Consi-dered					✓ Consi-dered		1) Administrative area inspection important in evaluating CW compliance 2) Operational information (utilities) important
Sensitive Military Facility (Challenge)	France (WP.335) (2/91)	No	7	1 (N/A)							(?)		(?)		1) Managed access and random sample selection of areas viewed as acceptable 2) Timing of notification and visit *critical*
Schedule 1 Production (Single Small-Scale Facility)	Canada (WP.290) (11/89)	Yes	7	2.5 (2)	✓	✓	✓	✓			✓	✓			1) Laboratory operation required adjustments to SSSF procedures 2) Records and visual inspection most useful
Military Facilities (Two) (Challenge Inspection) (Bilateral)	UK/FRG (WP.330) (5, 6/90)	Yes (Partial)	Unk	2 (For Each Inspection)						✓					1) Inspection of two installations reported, one in each country. 2) Off-site analysis could be replaced by mobile analytic instruments (GC/MS); mobile electric generator recommended. 3) On-site X-ray analysis used to examine munitions selected at random (5 to 10 per inspection) 4) Inspector training required as are inspection guidelines and checklists. 5) Technical Secretariat should maintain data on the various national health and safety regulations.

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Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE Facility	ON-SITE Inspector	OFF-SITE	
Military Facility (Challenge Inspection) (Bilateral)	Canada/ Nether-lands (WP.327) (11/90)	Yes	14	2										✓	1) Roles of requesting state and host state were simulated. 2) Notification of inspection site made at POE; 48 hour inspection period limit established. 3) All sampling should be done by inspectors in presence of escorts. 4) Larger team might be required if complete security and on-site sample analysis required.

COMMERCIAL FACILITIES

Commercial Facility (International Demo)	Italy (WP.224) (12/88)	No	15+	2-3						✓	✓			✓	1) Need for real-time analysis during inspection 2) Central laboratory, under TS, required
Commercial Facility (Routine - Schedule 2)	France (WP.240) (3/89)	No	3	3 (3)	✓	✓	✓	✓	✓	✓	✓			✓	1) Price & origin/destination removed for records examined 2) Mobile laboratory for inspectors desirable 3) Reference samples maintained to check/validate subsequent inspections
Commercial Facility Schedule 2 (Routine Inspection) Multi-purpose	Austria (WP.295) (also WP.260) (7/89)	No	7	2 (1)	✓	✓	✓	✓		✓	✓	✓	Present	✓	1) Records sufficient to establish non-diversion; computer-assisted system useful 2) Visual examination sufficient to determine Schedule 1 production unlikely 3) Desirable to have Schedule 1 analysis on-site
Commercial Facility - Schedule 2 (Routine Inspection)	US (WP.301) (3/90)	No	8	2 (3)	✓	✓	✓		✓	✓	✓	✓	Present	✓	1) Some difficulty in reconciling records from different on- and off-site sources 2) Need for standard records, process descriptions 3) Need for real-time analytic capability

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Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE Facility	ON-SITE Inspector	OFF-SITE	
Commercial Facility (Schedule 2)	USSR (WP.225) (9/12/88)	N/A	4 (not including monitor install-ation)	1 (5)	✓	✓	(?)		✓ (Moni-tor)			✓ (Declared sub-stances)	Present		1) Use of unattended monitor (sampling) successful 2) Examination of followup required in event of discrepancy 3) Facilities agreement.
Commercial Production – Initial/Routine (Schedule 2)	Swiss (WP.247) (Spring 88)	N/A	4	1.5 (.5)	✓	✓	✓		✓ Super-seded by Inspec			✓	Super-seded by Inspec		1) Need for "General" Facility attachment 2) Problems with large multi-purpose facility 3) Need for monitoring, or frequent "ad hoc" inspection 4) Need for standard data and record
Commercial Production – Initial/Routine (Schedule 2)	UK (WP.249) (3/89)	N/A	(3)	2 (2)	✓	✓	✓	✓	✓			✓		✓	1) Need for standard analysis for trace amounts of Schedule 1 chemicals 2) Need for standard facility agreements, records review systems/subsequent inspection reports.
Commercial Production – Initial/Routine (Schedule 2)	US (WP.250) (2/89)	N/A	5	2.5 (1)	✓	✓	✓	✓	✓	✓	✓	✓	Present	✓	1) Need for mass balance to confirm declaration 2) Need for off-site analysis for Schedule 1 Chemicals
Commercial Production (Routine Schedule 2)	France (WP 274) (10-11/89)	N/A	3	2.5 (4.5)	✓	✓	✓		✓	✓		✓	Present	✓ (Air)	1) Need for standard "Accounting" System 2) Need for mobile equipment for Schedule 1 analysis 3) Important National Authority role
Commercial Facility (Routine-Schedule 2)	Switzer-land (WP.309) (Docu-mentation of WP.247)	No	?	2.5 (?)	✓	✓	✓				✓	✓			1) Use of computerized system (facility) for records and spot checks 2) Detailed checklists used; visual and records checks 3) Sampling/analysis considered of minor significance
Commercial Facility (Routine-Schedule 2) Multi-purpose	Canada (WP.319) (7/90)	No	5	2 (?)	✓	✓	✓	✓				✓	Present		1) Primary audit of records 2) Sampling confined to product quality 3) More time would be required for complete audit

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Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE Facility	ON-SITE Inspector	OFF-SITE	
Commercial Facility (Routine-Schedule 2)	Sweden (WP.216) (11/88)	No	3	1 (2.5)	✓	✓	✓	Planning	Only			✓ Planning		✓	1) Intentional records "error" detected by inspectors 2) Full rather than "sample" audit would be too time-consuming
Commercial Facility (Routine-Schedule 2)	Hungary (WP.223 Add I) (12/88)	No	5	1 (2)	✓	✓	✓								1) Records necessary for convention purposes available 2) Planning for sampling & on-site monitoring and use of seals
Commercial Facility (Routine-Schedule 2)	Brazil (WP.226/ Rev 1) (12/88)	No	6	1 (1)	✓	✓	✓								1) Material balance was approximate based on available records 2) More time required for records examination & for facility agreement
Commercial Facility (Routine-Schedule 2)	GDR (WP.227) (10-12/88)	No	2 (5)	2 (4)	✓	✓	✓	✓				✓		✓	1) Negative test for Schedule 1 by GC 2) Accountant necessary on team for records examination 3) CBI protected.
Commercial Facility (Routine-Schedule 2)	Czecho-slovakia (WP.229) (1/89)	No	4	1 (3)	✓	✓	✓	✓	✓		✓			✓	1) Use of confidential information necessary (records audit) 2) Sampling to confirm material balance
Commercial Facility (Routine-Schedule 2) MPF	Australia (WP.234) (10-11/88)	No	5	2 (1)	✓	✓	✓	✓	✓	✓	✓	✓		✓	1) Four level confidentially used 2) Records audit most time-consuming 3) Vapor sampling on "non-declared" areas (CAM)
Commercial Facility (Routine - Schedule 2)	Nether-lands WP.251 (1st half of 89)	No	7	2 (3)	✓	✓	✓	✓	✓	✓	✓	✓ (Air)		✓	1) Inspection limited to delcared process equipment and areas 2) Inspection team should have analytic equipment 3) Inspection objective should be specific to minimize time and effort
Commercial Facility (Routine - Schedule 2)	India WP.291 (4-8/89)	No	6	1 (1) more days req for report	✓	✓	✓	✓	✓	✓	✓	✓			1) Required financial records cover import & export of raw material and products 2) Sampling used to check declaration and records

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Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE		OFF-SITE	
												Facility	Inspector		
Commercial Facility (Routine - Schedule 2)	New Zealand WP.331) (11/90)	No	4	2 (1)	✓	✓	✓	✓	✓			✓		✓	1) Records examiniation most time consuming; two auditors on inspection team desirable. 2) Both production and financial records must be reviewed (cross checked) 3) Larger inspection team would be required for larger, multiproduct plant 4) Some countries may have difficulties supporting their National Authoirities, regional cooperation may be required.
Commerical Facility (Challenge for Schedule 1 Production)	GDR (WP.292) (3/90)	No	6	Unk	✓				✓	✓	✓		✓		1) Transportable GC and Ion Mobility Spectography used on-site 2) Confidential info required 3) Use of computer process analysis system for risk evaluation
Commercial Facility (Ad Hoc)	Nether-lands (WP.252) (7/89)	No	7	.5					✓	✓ air	✓		✓ air	✓ waste water	1) Objective measures of non-presence of Schedule 1 2) Focus on sampling and analytic equipment
Commercial Facility (Ad Hoc – Schedule 3)	Norway (WP.285) (2/90)	No	6	2	✓	✓	✓	✓	✓	✓ air	✓		✓		1) On-site toxicology tests 2) CAM for Schedule 1 3) Importance of handwritten records in audit confidence
Commercial Facility (Challenge-Schedule 3) Multi Purpose	Czecho-slovakia (WP.311) (7/90)	Attempt	12	1 (Unk)	✓	✓	✓			✓				✓	1) Confidentiallity of records a problem 2) Negative sampling to detect Schedule 1 (detector kits)
Commercial Facility (Ad Hoc-Schedule 3)	Yugosla-via (CD.982) (7/89)	No	5	1	✓	✓	✓								1) Single purpose facility 2) Access to confidential information required

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Chemical Weapons Convention
Summary of National Trial Inspections Reported to the CD (Cont'd)

TYPE OF INSPECTION	REF.	SECURE FAC.	TEAM SIZE	DURATION IN DAYS (Init. Insp. in Days)	RECORDS EXAMINATION			SAMPLING				ANALYSIS			KEY ISSUES
					Raw Materials	Product Sales	Materials Balance	Raw Mat/ Products	Process	Area	Waste	ON-SITE		OFF-SITE	
												Facility	Inspector		
Commercial Facility (Ad Hoc-Schedule 3) Multi Purpose	FRG (WP.235) (1-2/89)	No	5	1 (1)	✓	✓	✓	✓	✓			✓			1) Declaration verified by record audit 2) Problems foreseen in multi-purpose facilities 3) Mixed samples used for Schedule 1 tests
Verify Non-Production (Ad Hoc-Undeclared)	Belgium (WP.243) (7/89)	No	2	1 (None)	✔	✔	Partial		✔			✔			1) Analytic chemist necessary to observe analysis by facility 2) Restriction on employment of inspectors by "competitors" desirable 3) Minimum disruption possible with restrictive protocol
Industrial Facility (Ad Hoc-Undeclared facility)	FRG WP.263 (6/89)	No	2	1 (None)	—	—	—	✔	✔	✔			✔		1) Inspectors selected scope of inpsection with a large complex 2) Mobile GC/MS used to screen for 15 compounds 3) Samples and analytic results do not leave site

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would be to define a set of equipment (with specified capabilities, costs, and operational characteristics). These definitions would be used in defining inspection procedures. Alternatively, individuals or groups defining procedures could specify required or desirable equipment and allow developers/suppliers to specify the availability, costs, and characteristics.

Finally, a complete, accepted count of the number of facilities subject to inspection under the various provisions of the CWC is required. While it is understood that technical, logistic, and security issues have to be resolved to prepare this listing, no reliable estimate of the costs of Technical Secretariat operations can be prepared without it.

3.2.2 Elements of Operational Costs. The annual costs incurred by the Technical Secretariat (TS), following start-up and capitalization, will include the following factors:

a. Processing, Reviewing, and Reporting on Declarations Submitted by States Parties. The processing of declarations submitted by the States Parties will be an early and continuing cost to the Technical Secretariat. The declarations submitted within 30 days after CWC Entry into Force will require significant staff effort. The annual declarations will require continued technical and administrative effort at a moderate level.

b. Inspections Requested by States Parties: Challenge Inspections, Allegations of Use. The response of the Technical Secretariat to requests for challenge inspections will require cost expenditures. If the number of these requests is low, it may be assumed that only an insignificant increase in the numbers of inspection personnel and equipment would be required to respond. The number of challenge inspections may be fixed (or limited) by the terms of the CWC, although this is not clear in the current (January 1991, CD/1046) version of the rolling text. A special class of challenge inspections, allegations of CW use, may well require a significant response activity beyond the staff and technical resources routinely available to the Technical Secretariat. Cost estimation in these cases is extremely uncertain, but this estimation may not be necessary for the purpose of implementing the CWC. Special cases may be assumed to be handled by separate appropriations and/or assessments.

c. Number of Facilities of a Specific Type (i.e., CW Stockpile, CW Production, Commercial Schedule 2, etc.). The number of inspected sites will be determined by the definitions and descriptions contained in the CWC. At this

point, the military-related facilities (CW storage site, CW production facilities, CW destruction facilities, and permitted production) are reasonably well defined. For commercial facilities (non-prohibited production), the definitions are less clear and are significantly dependent on the Schedules of Chemicals included in the CWC. Also, for commercial production and use, the number of facilities in each category (i.e., Schedule 2A and 2B production, Schedule 3 production, Chemical Weapons Capable) is uncertain. For Schedule 2 producers, numbers of worldwide facilities from 70 to 200 have been used in CWC analysis during 1990; and Schedule 2 is better defined and understood than the other commercial categories.

d. Initial Inspection. For each facility subject to routine inspection, an initial inspection will have to be done. This inspection will allow negotiations of a Facility Agreement between the Inspectorate and the facility which will establish the content and scope of the subsequent inspections.

e. Frequency of Inspection. The frequency of inspection is partially defined in the CWC (especially for military facilities) but will also depend upon the operating and inspection procedures adopted by the Technical Secretariat. This term is especially uncertain for commercial chemical facilities in the Schedule 3 production and "CW Capable" categories. The frequency of inspection; i.e., annual, biannual, etc.; will also vary based on the type of equipment used in the inspection process. The use of unattended monitoring equipment could reduce the frequency of on-site inspections for a given level verification.

f. Size and Composition of the Inspection Team and Duration of the Inspection. This factor is almost totally dependent upon the inspection protocols and procedures adopted by the Technical Secretariat. (It is unlikely that the CWC itself will specify procedures at the level of detail necessary to allow precise costing.) Recent cost estimates have assumed inspection teams numbering from 3 inspectors for 3 days to 10 inspectors for 5 days for the same Schedule 2 production facility. The factor of 5 variation in staff effort can only be reduced by definition of the inspection procedures for each type of facility. The type and amount of equipment available to the inspection team will also strongly influence both the required size of the team and the duration of the inspection. Until specific pieces of equipment and their characteristics are specified, it will not be possible to quantify this factor with precision. Again the definition of inspection procedures, for each type of facility inspected,

must be available to refine the cost estimate.

g. Equipment Required for Inspection of a Specific Facility Type. Equipment used by the inspectors will cause acquisition and operation costs to be incurred by the Technical Secretariat. Definition of the types of equipment to be employed is necessary to quantify these costs. As was mentioned above, the equipment used in the inspection process is interrelated with the required frequency of inspection, the size of the inspection team, and the duration of each inspection. The inspection procedures adopted are the key to both understanding these relationships and estimating the direct and indirect costs of inspection equipment to the Technical Secretariat.

h. Analytic Support for Inspections. Analytic support relates to the chemical analysis of samples collected by the inspectors and also data analysis conducted to support the planning and/or interpretation of inspections. Again the key information necessary to quantitatively assess the costs associated with analytic support are the procedures by which the different types of inspection will be conducted. The use of on-site equipment may reduce (or possibly increase) the need for analytic support; again the definition of inspection procedures is necessary to improve the accuracy and precision of the cost estimates.

i. Providing Requested Technical Assistance. The cost for technical assistance will depend upon the number of requests received from States Parties. Further, the role assumed by the Technical Secretariat in responding to these requests will influence the allocation of cost incurred. Two situations can be postulated to illustrate this feature. First, for some or all requests, the Technical Secretariat may serve as a clearinghouse with the major effort required to provide the requested assistance occurring at selected (or volunteering) National Authorities. In this case, minimal costs would be borne directly by the Technical Secretariat. In the second situation, the TS may, with internal staff and resources, directly respond to requests for assistance. The requirement for a Secretariat staff expert in chemical warfare and industrial chemistry would be significant in this case. In either situation, the number and type of requests for assistance by the States Parties will be a major uncertainty. It is unlikely that this uncertainty can be significantly resolved prior to Entry into Force of the CWC.

4. NATIONAL IMPLEMENTATION OF THE CHEMICAL WEAPONS CONVENTION

4.1 ORGANIZATION

The Chemical Weapons Convention (CWC) requires that each member of the Conference of State Parties establish or designate within its National Government an organization to interact with the international Technical Secretariat in assuring compliance with the Convention. Table 4-1 shows the responsibilities of the Federal Government and indicates the activities it would have to undertake. The interfaces that the Federal Government would have to establish and maintain are also indicated; these interfaces are illustrated in Figure 4-1. It is apparent that the Federal Government will have to establish appropriate organizational charter(s) and provide significant resources (funding) to effectively undertake its CWC responsibilities.

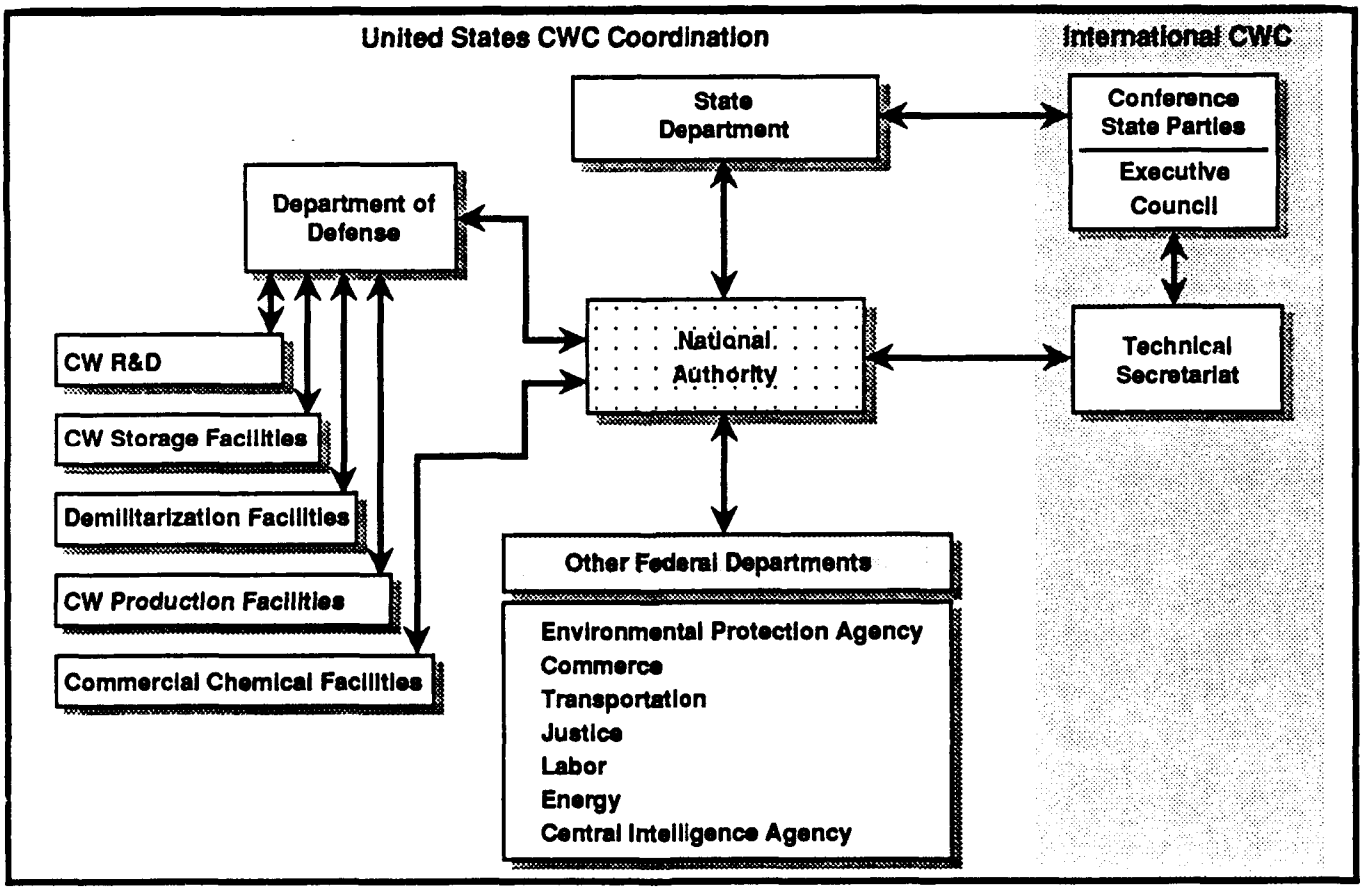

Figure 4-1. Communication, Coordination and Interface Responsibilities of the U.S. Federal Government Under the Chemical Weapons Convention (CWC)

Table 4-1
CWC RESPONSIBILITIES AND ACTIVITIES OF THE U.S. FEDERAL GOVERNMENT

CWC Article	National Authority Responsibilities	Activities	Interfaces
III Declarations	• Declaration of CW weapons stockpiles • Declaration of CW production facilities • Declaration of other CW facilities	• Collect, coordinate required information • Report declarations and updates to Technical Secretariat	• DoD, Army Installations and Commercial facilities
IV Chemical Weapons Declaration, Destruction	• Stockpile destruction plan(s) • Periodic reporting prior to and during destruction • Provide for on-site inspection and monitoring	• Support development, documentation of destruction plans • Prepare and submit initial, annual, and special reports • Prepare for, coordinate, support inspections	• DoD, Army, stockpile/ destruction facilities
V Production Facilities Declaration, Closure, Destruction	• Closure plans • Initial plans and periodic updates to disable and destroy facilities • Provide for on-site inspection and monitoring	• Support development, documentation of closure and destruction plans • Prepare and submit initial, annual, and special reports • Prepare for, coordinate, support inspections	• DoD, Army, production facilities
VI Activities not Prohibited	• Declarations concerning chemical production • Annual reports on production and production facilities • Provide for on-site inspection and monitoring	• Establish data reporting procedures and formats • Collect, organize, periodic and special data • Support development and documentation of facility agreements • Prepare for, coordinate, support initial and periodic inspection	• Industry association(s), corporations, chemical production/consumption facilities; federal and state agencies with related responsibilities (regulatory, commerce)
IX Consultations, Cooperation Fact-Finding	• Consult and cooperate on procedures development • Support reviews of declarations and data • Assist fact-finding activities	• Provide additional data and clarifications • Prepare for, support, and accompany fact-finding missions (i.e., Challenge Inspections)	• Military organizations, commercial chemical companies
X Protection Against Chemical Weapons	• Respond to requests for assistance in chemical protection	• Collect and maintain information on chemical warfare protection • Coordinate, prepare and submit information requested	• DoD, Army, chemical defense R&D organizations
XI Economic and Technological Development	• Provide point of contact for information, exchanges and cooperation in research on chemical production and utilization	• Develop and maintain contacts with chemical research community • Organize and support information development and exchange	Federal and private chemical research establishments

The Government must plan for, collect, manage, analyze, and report on large amounts of data required for compliance with the initial and periodic

declarations. The Federal Government must also supervise the preparation, conduct, and follow-up of on-site inspections conducted by the international Technical Secretariat in the United States. With regard to inspections, each of the following activities will require expenditure of resources:

- Negotiate the content and procedures for on-site inspections with the inspected parties and the international inspectorate
- Conduct and assess mock inspections to train facilities personnel for on-site inspections
- Escort and support international inspection teams
- Coordinate inspection follow-up questions/requests for clarification.

A third major area requiring activity, and resource commitments, by the Federal Government is the role of point of contact for requests for information and technical assistance from States Parties to the CWC. According to the draft CWC text, requests may be of two types: 1) requests for information or assistance in the area of chemical weapons protection, and 2) requests for technical assistance in industrial chemistry. Both types of assistance will require that the Federal Government have on-staff and/or on-call technical experts and information resources in the subject disciplines.

The position of the Federal Government, in relation to other organizations, in carrying out the above functions is illustrated in Figure 4-1. The communication, coordination, and interface channels illustrated can be more explicitly defined as the CWC text and the US implementation strategy are further elaborated. It is now clear, however, that the Federal Government will have a complex mission and that responsibilities must be assigned and work begun well before the CWC Entry into Force for the US.

4.2 RESOURCES AND COSTS

In many ways, the activities of the Federal Government and other assigned agencies will parallel those of the Technical Secretariat. The number and type of on-site inspections will strongly affect the resource requirements for both agencies. Reporting requirements established by the CWC must be satisfied by the Federal Government. Thus, any uncertainties which affect the ability to accurately estimate costs for the international Technical Secretariat apply equally to resource estimates made for the Federal Government and private agencies.

While it is not possible in this study to quantify costs for the Federal

Government, Table 4-2 indicates the factors which must be considered in preparing a defensible cost estimate. As was the case for the Technical Secretariat, the major items which must be specified to allow precise cost estimation are:

- Procedures to be used in inspecting each type of facility
- Equipment to be used by inspectors and in monitoring each type of facility
- The number of facilities to be inspected (for the US the principle uncertainty here is the number of industrial facilities subject to periodic, ad hoc, and challenge inspections).

Table 4-2
FACTORS AFFECTING THE RESOURCE REQUIREMENTS FOR THE U.S. IMPLEMENTATION

- Number and type of training inspections
- National legislation implementing the CWC
- Training of facilities personnel required to support international inspections
- Number of international inspections (periodic and continuous) anticipated in the U.S.
- Data collection and reporting procedures required by Technical Secretariat
- Support required by the CWC Technical Secretariat
- Requests for consultation and technical support
- Number and type of challenge inspections
- Requirements for analysis and assessment of CWC issues
- Requirement for specialized capabilities (i.e., Analytical Chemistry Laboratory)

Initial Federal expenditures will be required prior to signature and Entry into Force of the Convention. Continuing (annual) expenditures will be required to support the international organization which will be established to execute the Convention and to carry out the US obligations as a party to the Convention. Elements of these costs are presented in Table 4-3; generalized trends in costs over the first 10 years of the CWC are shown in Figure 4-2.

Table 4-3
FACTORS INFLUENCING FEDERAL BUDGET TRENDS FOR IMPLEMENTATION OPERATION OF CHEMICAL WEAPONS CONVENTION

	Initial Period *(-1 to 1 Year after Entry Into Force)*	**Initial Operation** *(Years 2-10)*	**Sustaining Operations** *(More Than 10 Years)*
General	Purchase Capital Equipment Develop Computing/ Communications Systems Recruit and Train Staff Define Procedures and Techniques Conduct Initial Inspections	Followup Inspections Initial Approximately Equal Focus on Military and Commercial Facilities Number of Inspections Decreasing During Period as Military Facilities Close	Most Focus on Commercial Facilities Number of Inspections Slowly Increase Over Time with Size and Complexity of Chemical Industry Increase Due to Expansion of Schedules of Chemicals to be Monitored
Specific Budget Items:			
National Authority/ Federal Activites	High Startup: Personnel Recruitment/Training; Computer Systems Development; collect/ validate declarations	Decreasing Toward End of Period as Military Facilities Close	Moderate and Slowly Increasing Costs (Mirror Technical Secretariat)
Department of Defense	Moderate Startups Modification of In-Place Systems	Decreasing Costs as Facilities Close	Minimal Long-Term Costs Associated with SSSF
National Contribution to International Technical Secretariat	High Startup: Capital Purchase, Personnel Recruitment and Training	High Initial, Decreasing as Military Facilities Close	Moderate (1/2 Initial Level) Costs Increasing with Size and Complexity of Chemical Industry Participation. Possible Reduction Due to Additional Signatories

Direct Federal costs as opposed to Federal contributions to international activities, can be divided into two major categories: costs for the agency(s) responsible for CWC implementation, and costs for implementation borne by the Department of Defense. Federal Government costs are treated in the previous

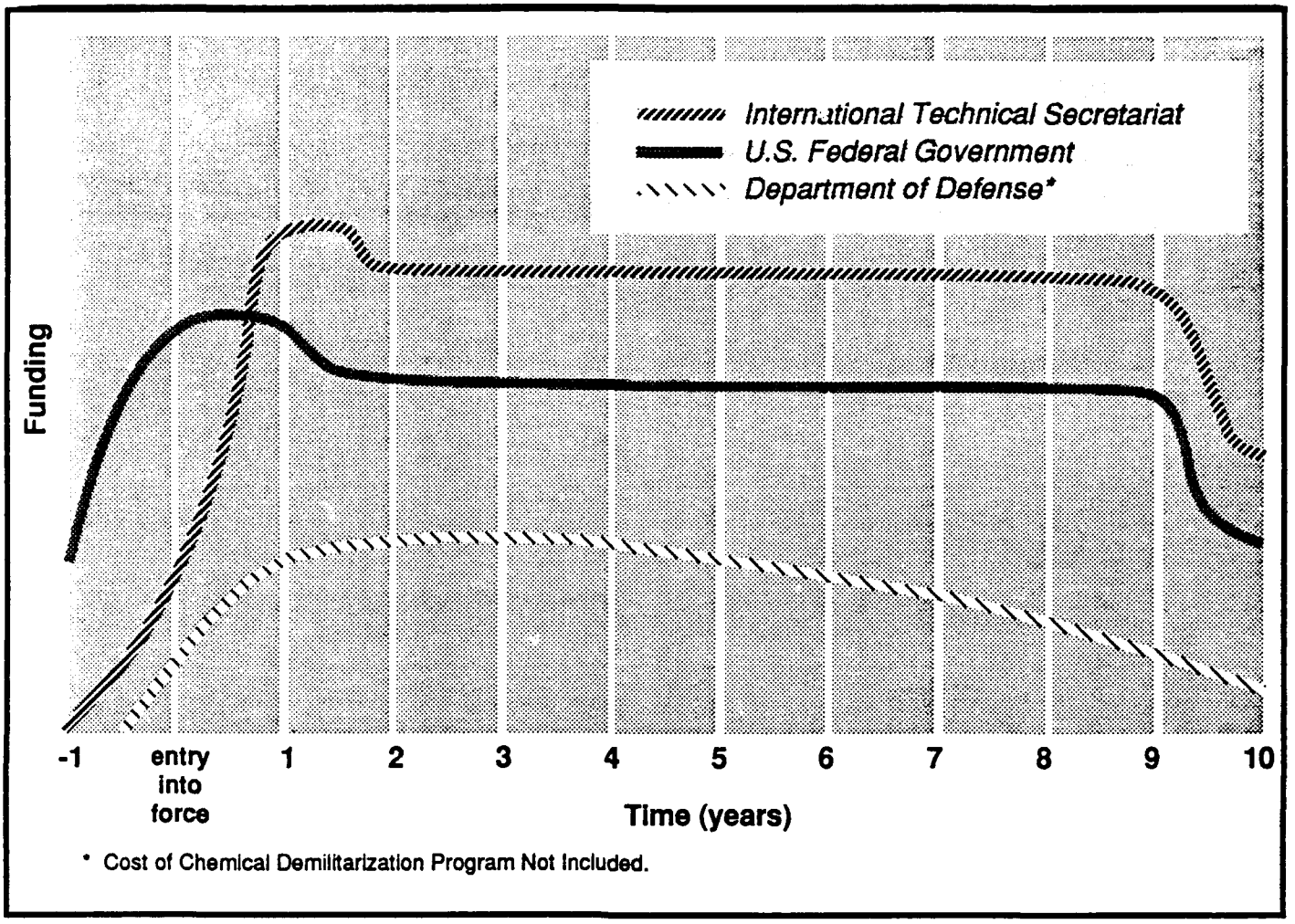

Figure 4-2. Federal Budget Trends for Implementation of Chemical Weapons Convention

section. Table 4-4 highlights those areas of new or increased costs which will he borne by the Department of Defense (DoD). There are four activities, basically associated with specific facilities or types of operations, which will require increased DoD expenditures due to the CWC. While detailed cost estimates cannot be made until inspection and monitoring procedures are defined, the following paragraphs indicate the nature of the activities leading to cost increases.

For chemical munitions storage areas, implementation of the CWC will result in inspections by the international Technical Secretariat until all chemical agents and munitions in storage are verifiably destroyed. Each storage location must receive, escort, and support these inspectors. Further, monitoring devices

Table 4-4
DEPARTMENT OF DEFENSE ACTIVITIES - COSTS RELATED TO IMPLEMENTATION OF THE CHEMICAL WEAPONS CONVENTION

Facility or Operation Affected	Items Causing Additional or Increased Costs
Chemical Weapons Storage Facilities	1) Escort and support of inspectors in inventorying stockpile (initial & periodic) 2) Increased operational costs due to seals and/or monitors 3) Increased recordkeeping & reporting to meet CWC requirements 4) Sampling & analysis to verify agent fill (technicians, laboratories) 5) Demonstration of stockpile elimination (installation closure)
Chemical Weapons Destruction Facilities*	1) Housing, support, & escort of permanent inspection team (space, utilities, personnel) 2) Operational impacts of monitors or other measures for verifying destruction of weapons 3) Demonstration of facility closure and destruction
Former Chemical Weapons Production Facilities	1) Escort & support of inspectors 2) Operational impacts of use of seals & monitors 3) Impact of inspections on destruction schedules & operations 4) Economic loss due to inability to salvage or reuse equipment & buildings
Chemical Research & Development - Single Small-Scale Facility	1) Recordkeeping and reporting to verify production, inventories, transportation, and use (management & computer personnel time, computer usage) 2) Escort for & support of periodic inspections 3) Operational impacts of seals & monitoring equipment

* *CWC costs should include additional costs based on CWC but not costs for activities programmed for execution in the absence of the CWC (i.e., the $4 billion dollar stockpile destruction program)*

and/or seals may be emplaced by the inspectors which may result in increased or less efficient depot operations. The extent of these costs will depend on the type of monitors used on these emplacements. The initial and annual declarations required by the CWC will require some additional administrative and data processing expenses. These costs should be moderate for the initial submission and minimal for succeeding annual submissions. A final, and potentially major, cost impact to chemical storage locations would be a requirement to sample and analyze the chemical fill of stored munitions. Procedures would need to be developed and considerable effort expended if extensive sampling of munitions is required to comply with the CWC.

At the chemical weapons destruction facilities, currently scheduled to be constructed and operated at each storage location, an international inspection team will be present during all destruction operations. Increased costs could be expected to accommodate and support these inspectors and to provide the necessary data and reporting. The destruction of munitions and, ultimately, the destruction of the facility itself must be verifiable by the international inspectors. Increased costs due to CWC are not expected to be major but the accurate quantification of these costs must await explict definition of inspection and monitoring procedures.

The above considerations also apply to former chemical weapons production facilities except that periodic rather than continuous inspector presence is expected. Some additional data collection and reporting will be required. Impact on facility destruction schedules and operations may be expected. Cost quantification is dependent on the type of inspections defined and the seals and monitors to be employed.

Finally, the US would be allowed to retain and operate a small-scale chemical agent production capability (1 metric ton per year) as well as a facility capable of producing up to 10 kilograms per year. This facility would be subject to inspection and reporting requirements under the CWC. Given the tight domestic control already imposed on chemical agents and agent production, the additional international requirements assumed under the CWC are not likely to prove onerous or costly.

Other than the areas of DoD expense discussed above, other Federal expenditures associated with CWC compliance should be basically confined to the National Authority and other designated implementing agencies. There are two possible exceptions to this general statement. First, is the US participation in the Conference of States Parties and the Executive Council. The nature and extent of this participation must be defined if it is determined that these costs must (or should) be included in estimates of Federal budget impacts. Second, Federal agencies having facilities unrelated to chemical weapons may incur costs related to preparation for and support of challenge inspections. The magnitude of these costs will depend on both the number of challenge inspections ultimately directed to US Government facilities and the extent of preparations necessary to prevent the loss of sensitive information.

5. REQUIREMENTS FOR IMPLEMENTATION IN THE PRIVATE SECTOR

5.1 DEFINITION

Provisions of the CWC will require reporting by and inspection of private industrial facilities which manufacture (and potentially transport and consume) specific chemicals or classes of chemicals. These provisions will require industrial organizations, primarily chemical manufacturers, to undertake activities and incur costs. Table 5-1 highlights these activities and the major elements of cost for private-sector organizations.

Table 5-1
ELEMENTS OF COSTS* BORNE BY THE PRIVATE SECTOR UNDER THE CHEMICAL WEAPONS CONVENTION

Activity	Cost Elements
Data Reporting	Management time, technician and clerical time, computer resources (application program, data storage, operating time)
Preparation for and Conduct of Inspections	1) Direct costs - Management time, engineer and chemist time, escort staff, laboratory equipment usage, and supplies 2) Indirect costs - Loss of production, inefficient plant or equipment utilization 3) Potential cost - Loss of business-sensitive information

** Cost categories listed apply to Schedule 2 chemical producers but would also be applicable to other facilities (Schedule 3, Chemical Weapons Capable plants, chemical consumers), if subject to routine, ad hoc, or challenge inspections*

5.2 RESOURCES AND COSTS

Private-sector costs are also affected by the same uncertainties as are the Technical Secretariat and National Authority. Specifically, costs borne by an industrial plant will depend on the expected number of on-site inspections and, even more strongly depend, on the procedures under which the inspections are conducted. The type of equipment used in inspecting and monitoring facilities will also affect the costs of private-sector response. The equipment and its use must be defined to allow precise cost estimation.

One further complicating factor regarding private sector cost is the great diversity in facilities subject to CWC inspection and reporting requirements. Small single product manufacturers and large integrated industrial complexes will

both be impacted. A detailed listing and categorization of subject facilities need to be established to allow an accurate evaluation of costs.

IMPLEMENTATION OF A TREATY BANNING CHEMICAL WEAPONS

COST REPORT

6. STAFFING AND COST ESTIMATES FOR THE TECHNICAL SECRETARIAT

6.1 INTRODUCTION

The United States and Soviet Union, through the bilateral process, have declared storage and production facilities that would be subject to inspection under the Chemical Weapons Convention. More than forty National Trial Inspections have been conducted by a number of countries. Based on reports of these trials, as well as other information in the public domain, it is now possible to begin development of a quantitative model for the manpower needs of the Technical Secretariat.

In reviewing other studies on the structure of the Technical Secretariat (TS), is was found that emphasis was placed on the Inspection Directorate with only a cursory evaluation of the other functions. In this study we have tried to address not only the Inspection Directorate function and structure but also the other areas involved in the day-to-day operation of the TS.

For specific areas not addressed in this paper, but which need further evaluation, refer to Section 7, Further Work Required.

Figure 6-1 delineates the general, over-all structure of the Technical Secretariat.

6.2 EXISTING ESTIMATES

A number of recent efforts have attempted to define the inspection workload required by the Chemical Weapons Convention (CWC). While many issues remain to be resolved, these efforts are beginning to identify the staffing and cost of the Technical Secretariat.

Two studies[1] have attempted to estimate the scope and cost of the CWC Technical Secretariat. The results of these efforts are summarized in Table 6-1. While numerous assumption and estimating factors will need to be evaluated to ensure consistency between these estimates and the staffing and costing figures presented in this paper, the general level of agreement among the studies argues that expected annual costs for the CWC implementation can be specified within ±50%.

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[1] "The Chemical Weapons Convention and the International Inspectorate: A Quantitative Study", Canada, August 1990 and "Inspection Costs for a Multilateral Chemical Weapons Convention", Institute for Defense Analysis, June 1990.

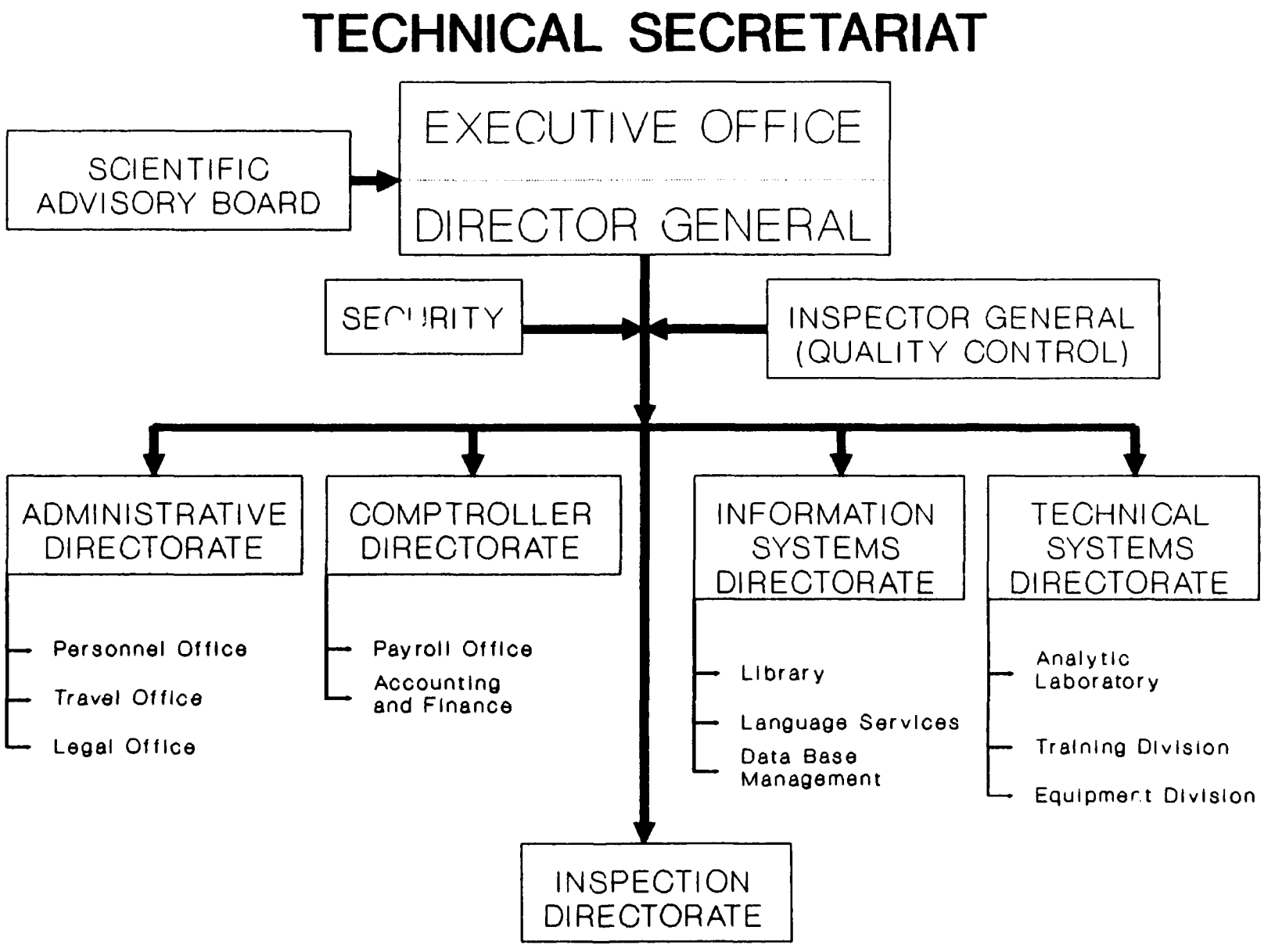

Figure 6-1 Technical Secretariat Organizational Structure

Table 6-1

International Costs for CWC Inspections ($M)

	Number of Inspected Sites*	Costs for Initial Years	Annual 1990 Average Costs
Canadian Estimate	550	120	≈100 (over 10 years)
Institute for Defense Analysis Estimate	700	114	≈ 50 (over 15 years)

* Estimates of the number of ad hoc and challenge inspections were very uncertain.

6.3 STAFFING OF THE TECHNICAL SECRETARIAT

The following pages present the suggested staffing profiles as well as the rationale for the various Directorates of the Technical Secretariat as delineated in Figure 6-1. The salary schedule that is shown on Table 6-2 was based on the IAEA scale of 1 July 1990. The salary schedules do not reflect a cost of living or other allowances. These factors are, however, included in the individual Directorate cost estimates presented in this Section.

The miscellaneous category under ODC includes such items as janitorial services, equipment maintenance, service contracts, utilities, etc. All cost estimates presented in this document are stated in current (1991) US dollars. Factors such as inflation, currency exchange rates, and interest rates have not yet been considered. Given the international character of the Technical Secretariat and its long-term operation, these factors must be addressed to assure both long-range stability and the necessary multilateral participation.

Table 6-2

Salary Scale For Technical Secretariat Project Directors, Professionals, and Technical/Clerical Staff

(In United States Dollars)

	STEPS														
Level	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	**XV**
DG	121,635														
DDG	110,000														
M-1	93,313	95,375	97,438	99,500	101,650	103,810	105,915	108,020	110,125	112,230	114,350	116,490	118,643	120,815	123,000
M-2	83,600	85,366	87,132	88,898	90,664	92,430	94,310	96,185	98,060	100,050	102,000	103,930	105,893	107,860	109,800
M-3	80,068	81,834	83,644	85,450	87,250	89,060	90,870	92,675	94,485	96,310	98,145	100,020	101,950	103,820	105,740
PS-1	73,317	74,885	76,454	78,022	79,590	81,180	82,780	84,380	85,975	87,575	89,265	90,955	92,645	94,340	96,050
PS-2	61,825	63,327	64,829	66,356	67,885	69,415	70,945	72,475	74,005	75,535	77,065	78,730	80,395	82,055	83,725
T/C-1	47,811	49,172	50,533	51,895	53,260	54,620	56,015	57,425	58,840	60,250	61,660	63,070	64,480	65,960	67,435
T/C-2	38,183	39,359	40,536	41,712	42,890	44,065	45,250	46,470	47,680	48,900	50,180	51,470	52,750	54,070	55,375
T/C-3	26,875	27,916	28,975	30,034	31,130	32,225	33,315	34,410	35,520	36,650	37,805	38,995	40,215	41,460	42,740

Level Legend

Director General	(DG)	Professional Staff	(PS-1)
Deputy Director General	(DDG)	Professional Staff	(PS-2)
Manager	(M-1)	Technical Clerical Staff	(T/C-1)
Manager	(M-2)	Technical Clerical Staff	(T/C-2)
Manager	(M-3)	Technical Clerical Staff	(T/C-3)

6.3.1 PREPARATORY COMMISSION

Although the focus of this report is on the Technical Secretariat, the Preparatory Commission requires consideration since the organizational, administrative and staffing issues associated with the TS require a significant expenditure of effort prior to the CWC Entry into Force. The initial years of the treaty implementation will be critical in establishing the credibility of the TS operations and maintaining confidence in the procedures and protocols of the Convention. To assure that the TS is ready to accomplish all assigned functions upon Entry into Force, an adequately staffed and chartered Preparatory Commission must begin work at least two years prior to the expected ratification and Entry into Force of the Chemical Weapons Convention.

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Preparatory Commision	4*	30	16
TOTAL	**4**	**30**	**16**

* *Includes one Director and three Assistant Directors*

@@@

<u>MAJOR FUNCTION(S)</u>: To initiate and develop the procedural framework under which the TS will operate as well as make initial equipment purchases and hire personnel.

<u>ACTIVITIES</u>:

<u>Policies and Procedures</u>:

1. Receipt, storage and reporting of confidential information
2. Personnel policies (including security)
3. Budget and accounting
4. Travel
5. Salary and benefits

<u>Staff Recruitment and Training</u>:

1. Prepare position description
2. Define required qualification/experience
3. Identify, screen and select TS applicants
4. Develop and test training program
5. Define and acquire training equipment/devices

Equipment Selection, Testing and Acquisition:

1. On-site safety equipment
2. Evaluate, select and purchase inspection equipment
3. Evaluate, select and purchase communications equipment
4. Evaluate, select and purchase computer equipment
5. Evaluate, select and purchase laboratory and maintenance equipment
6. Prepare acquisition, budget and schedules

Table 6-3 shows the estimated capital costs. A substantial portion of the equipment will be purchased during the existance of the Preparatory Commission with the rest budgeted and planned.

BASIS OF STAFFING ESTIMATE:

As is evident from the range and scope of activities, the staffing of the Preparatory Commission must:

- include experts in a variety of technical and management disciplines and
- increase in size during operations to a point from which the transition to a functional and viable Technical Secretariat can be made.

Given the above, the Preparatory Commission should be initially staffed at the level of about 50. Over a two to three year period, this staff should be increased to several hundred prior to CWC Entry into Force.

Table 6-3

Capital Equipment for CWC Technical Secretariat

Analytic Chemistry Lab	$9,500
Communications	2,500
Computer Equipment — Central Office — Inspectorate	 12,500 2,500
Security	500
Safety Equipment	500
Field Equipment	15745*
Total	$43,245

* See Table 6-4.

Table 6-4

Technical Secretariat Field Equipment Requirements ($K)

Type of Inspection	Fielding Sampling/ Analysis (per Team)	Commun- ications (per Team)	Number of Teams Required	Monitoring Seals (per Site)	Number of Sites	Cost per Inspection Type
CW Weapons Stockpile	120 (a, c, d)	20 (e, f)	6	50 (50h)	41	2,890
CW Weapons Destruction	20 (a, d)	20 (e, f)	13	50 (3g, 5h)	41 (13 operating at any one time)	1,170
CW Production Facilities	120 (a, b, d)	5 (e)	2	10 (10h)	27	520
Allowed Schedule 1	10 (d)	5 (e)	1	20 (1g, 5h)	20	415
Commercial Schedule 2	120 (a, b, d)	5 (e)	13	30 (2g)	200	7,625
Commercial Schedule 3	120 (a,b, d)	5 (e)	19		500 *	2,375
Challenge Inspections	220 (a, b, c, d)	20 (e, f)	3	10 (10b; per team)	50 *	750
Total						**15,745**

Field Sampling/Analysis

a. CW Detection Equip. $ 10K
b. Portable GC/MS $ 100K
c. Munitions Testing $ 100K
d. Sample Collection/ Transportation $ 10K

Monitoring/Seals

e. Process $ 15K
f. Entry/Exit $ 5K

Communications

g. Phone/FAX/Data $ 5K
h. On-Site Radio $ 15K

*** Number of sites inspected in a year.**

The Technical Secretariat Project

Preparatory Commission — **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Director	1	1,904 Hr	$52.88	$100,692	$110,000
Asst Dir	3	5,712 Hr	$40.19	$229,578	$83,600
Pro Staff	30	57,120 Hr	$35.25	$2,013,398	$73,317
Technical/Clerical	16	30,464 Hr	$22.99	$700,247	$47,811
Direct Labor (DL) Total	50	95,200 Hr	$31.97	$3,043,916	
Labor Burden					
Cost of Living All		$3,043,916	15.0%	$456,587	
Housing Allow		$3,043,916	60.0%	$1,826,349	
Depend School Allow		50 Emps	$10,000 per Emp	$500,000	
Employ Benefits		$3,043,916	30.0%	$913,175	
Labor Burden (LB) Total				$3,696,111	
DL/LB Total				$6,740,027	
Other Direct Costs (ODCs)					
Travel		34 People	$50,000	$1,700,000	
Supplies		$3,043,916	5.0%	$152,196	
Misc		$3,043,916	1.5%	$45,659	
Equipment				$43,245,000	
ODC Total				$45,142,855	
DL/LB/ODC Total				$51,882,882	
Escalation		$51,882,882	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		95,200 Hr	$544.99	$51,882,882	

6.3.2 EXECUTIVE OFFICE

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Executive Office	5*	12**	11
TOTAL	**5**	**12**	**11**

* Includes Director General, Deputy Director General, and three Associate Directors General.
** Includes executive and special assistants.

MAJOR FUNCTION(S): To oversee the business of the Technical Secretariat, report to the Executive Council on the activities of the Technical Secretariat, and assist the Conference of States Parties and the Executive Council in the performance of their duties.

ACTIVITIES:

1. Prepare monthly, quarterly and annual reports compiled from all Technical Secretariat Directorates and forward them to the Executive Council.

2. Provide liaison for the needs and requirements of the Executive Council and the Conference of States Parties and disseminate tasking to the various Directorates under them.

BASIS OF STAFFING ESTIMATE:

The Executive Office will be the central, controlling body for the Technical Secretariat. Since there will be over 1,000 personnel under their control, it was estimated that the Director General would require one deputy and three associate directors in order to adequately manage the organization. Each manager would require one clerical support person with each two professional staff members sharing a support person.

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Executive Office **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Dir Gen	1	1,904 Hr	$58.48	$111,343	$121,635
Dep Dir Gen	1	1,904 Hr	$52.88	$100,692	$110,000
Asst Dep Gen	3	5,712 Hr	$44.86	$256,252	$93,313
Pro Staff A	6	11,424 Hr	$40.19	$459,157	$83,600
Pro Staff B	6	11,424 Hr	$38.49	$439,758	$80,068
Tech/Clerical	11	20,944 Hr	$19.49	$408,166	$40,536
Direct Labor (DL) Total	28	53,312 Hr	$33.30	$1,775,368	
Labor Burden					
Cost of Living All		$1,775,368	15.0%	$266,305	
Housing Allow		$1,775,368	60.0%	$1,065,221	
Depend School Allow		28 Emps	$10,000 per Emp	$280,000	
Employ Benefits		$1,775,368	30.0%	$532,610	
Labor Burden (LB) Total				$2,144,137	
DL/LB Total				$3,919,505	
Other Direct Costs (ODCs)					
Travel		17 People	$20,000	$340,000	
Supplies		$1,775,368	5.0%	$88,768	
Equipment				$0	
Misc		$1,775,368	1.5%	$26,631	
ODC Total				$455,399	
DL/LB/ODC Total				$4,374,904	
Escalation		$4,374,904	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		53,312 Hr	$82.06	$4,374,904	

6.3.3 SCIENTIFIC ADVISORY BOARD

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Scientific Advisory Board*	1	3	5
TOTAL	**1**	**3**	**5**

* Staffing for administrative support; board member expenses carried as a direct cost (consultant) to the Technical Secretariat.

MAJOR FUNCTION(S): To provide recommendations on specific issues.

ACTIVITIES:

1. Maintain a data base on subject matter experts (SMEs) compiled from lists provided by States Parties.

2. Convene a board of SMEs; as directed by the Director General, the Executive Council, or the Conference of States Parties; appropriate to a particular issue before the Technical Secretariat.

3. Provide support to the Executive Council and the Conference of States Parties, as required.

BASIS OF STAFFING ESTIMATE:

The Scientific Advisory Board, as shown here, is intentionally small and represents only the administrative branch of this body. It acts as the central point for subject matter expertise. The SMEs from the various States Parties would be used on an as-needed basis. Therefore, the actual make-up would vary depending on the specific issues being addressed. Office space and other support for the SME will be arranged for by this staff and provided by the Technical Secretariat.

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Scientific Advisory Board **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Manager	1	1,904 Hr	$44.86	$85,417	$93,313
Pro Staff	3	5,712 Hr	$40.19	$229,578	$83,600
Tech/Clerical	5	9,520 Hr	$19.49	$185,530	$40,536
Direct Labor (DL) Total	9	17,136 Hr	$29.21	$500,526	
Labor Burden					
Cost of Living All		$500,526	15.0%	$75,079	
Housing Allow		$500,526	60.0%	$300,316	
Depend School Allow		9 Emps	$10,000 per Emp	$90,000	
Employ Benefits		$500,526	30.0%	$150,158	
Labor Burden (LB) Total				$615,552	
DL/LB Total				$1,116,078	
Other Direct Costs (ODCs)					
Travel		9 People	$30,000	$270,000	
Supplies		$500,526	5.0%	$25,026	
Equipment				$0	
Misc		$500,526	1.5%	$7,508	
ODC Total				$302,534	
DL/LB/ODC Total				$1,418,612	
Escalation		$1,418,612	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		17,136 Hr	$82.79	$1,418,612	

6.3.4 SECURITY

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Security Management	1	1	1
Building Security	1	5	20
Personnel Security	1	10	4
Document Security	1	4	6
TOTAL	**4**	**20**	**31**

MAJOR FUNCTION(S): To provide building, personnel and document security against unauthorized use or disclosure.

ACTIVITIES:

1. Provide building security against unauthorized entrance of personnel and acts of aggression.
2. Provide personnel security against entrance by unauthorized personnel as well as obtain clearances and approval by States Parties for inspectors.
3. Provide document security against dissemination of sensitive data, including confidential business information, to unauthorized personnel.

BASIS OF STAFFING ESTIMATE:

Security management will consist of the manager, one assistant and one clerical person to administer the routine office operations.

Building security will be a 24-hour-a-day, 7-day-a-week operation. This will require one manager to oversee operations and other duties in the building. The five professional staff members would be in charge of the various shifts and augment the guard staff during times of emergency. Based on three shifts and forty hours per week, it was estimated that twenty personnel would be needed for this function. This would provide approximately five personnel per shift. However, the size of the guard staff could vary depending upon the size and physical characteristics of the building.

This office would also develop and maintain security files on Technical Secretariat personnel. This includes background investigations with periodic

follow-ups. Clearances of personnel will be a key measure by which confidential information can be effectively acquired and safely maintained.

Document security would ensure the safe storage of Entry into Force documents of the States Parties and annual declarations as well as other confidential business information (CBI).

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Security - Open 24 Hrs **Base Year - FY 1991**

	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Direct Labor					
Manager	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	3	5,712 Hr	$36.00	$205,646	$74,885
Pro Staff	20	38,080 Hr	$29.72	$1,131,873	$61,825
Tech/Clerical	31	59,024 Hr	$12.92	$762,630	$26,875
Direct Labor (DL) Total	55	104,720 Hr	$20.79	$2,176,675	
Labor Burden					
Cost of Living All		$2,176,675	15.0%	$326,501	
Housing Allow		$2,176,675	60.0%	$1,306,005	
Depend School Allow		55 Emps	$10,000 per Emp	$550,000	
Employ Benefits		$2,176,675	30.0%	$653,002	
Labor Burden (LB) Total				$2,835,509	
DL/LB Total				$5,012,183	
Other Direct Costs (ODCs)					
Travel		24 People	$10,000	$240,000	
Supplies		$2,176,675	5.0%	$108,834	
Equipment				$0	
Misc		$2,176,675	1.5%	$32,650	
ODC Total				$381,484	
DL/LB/ODC Total				$5,393,667	
Escalation		$5,393,667	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		104,720 Hr	$51.51	$5,393,667	

6.3.5 INSPECTOR GENERAL (QUALITY CONTROL)

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Inspector General Management	1	2	2
Technical/Analytic	1	3	1
Inspections	1	10	2
Budget/Financial	1	2	1
Administration	1	1	1
Internal Affairs	1	5	1
TOTAL	**6**	**23**	**8**

MAJOR FUNCTION(S): To ensure that the operation of the Technical Secretariat is in accordance with the guidelines set forth by the Executive Council and the Conference of States Parties as well as guardian of Technical Secretariat operational assurance.

ACTIVITIES:

1. Provide quality control assurance to the technical/analytical branch to ensure that samples are analyzed in accordance with established procedures.
2. Ensure that inspections are executed in a timely and reliable manner.
3. Ensure that collection and disbursement of funding is accurate and conduct periodic audits.
4. Ensure that approved administration practices are followed in accordance with directives from the Executive Council and Conference of States Parties and conduct regular desk audits.
5. Investigate allegations of discrepancies within the Technical Secretariat itself.

BASIS OF STAFFING ESTIMATE:

The Inspector General's Office would be organized to focus on each of the operating Directorates. The staffing is determined by the relative size and technical complexity of each Directorate.

The Internal Affairs Office would investigate and act on complaints relative to the operation of the Technical Secretariat. Complaints may arise internal to the organization or made by States Parties.

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Inspector General Management **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Manger	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	5	9,520 Hr	$38.49	$366,465	$80,068
Pro Staff	23	43,792 Hr	$35.25	$1,543,605	$73,317
Tech/Clerical	8	15,232 Hr	$18.36	$279,617	$38,183
Direct Labor (DL) Total	37	70,448 Hr	$32.17	$2,266,213	
Labor Burden					
Cost of Living All		$2,266,213	15.0%	$339,932	
Housing Allow		$2,266,213	60.0%	$1,359,728	
Depend School Allow		37 Emps	$10,000 per Emp	$370,000	
Employ Benefits		$2,266,213	30.0%	$679,864	
Labor Burden (LB) Total				$2,749,524	
DL/LB Total				$5,015,737	
Other Direct Costs (ODCs)					
Travel		29 People	$10,000	$290,000	
Supplies		$2,266,213	5.0%	$113,311	
Equipment				$0	
Misc		$2,266,213	1.5%	$33,993	
ODC Total				$437,304	
DL/LB/ODC Total				$5,453,041	
Escalation		$5,453,041	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		70,448 Hr	$77.41	$5,453,041	

6.3.6 ADMINISTRATIVE DIRECTORATE

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Directorate Management	1	1	2
Contracts	1	5	5
Personnel Office	2	10	6
Travel Office	1	3	8
Legal Office	1	5	4
Purchasing	1	4	5
TOTAL	**7**	**28**	**30**

MAJOR FUNCTION(S): To ensure the smooth operation of all ancillary responsibilities of the Technical Secretariat.

ACTIVITIES:

1. Prepare and execute contracts.
2. Hire all Technical Secretariat personnel.
3. Arrange for the travel requirements of the inspectors as well as other Technical Secretariat personnel.
4. Maintain an approved list of inspectors, by country.
5. Assist the Technical Secretariat in negotiating Facility Agreements.
6. Maintain a file of applicable national laws and provide advice and assistance to inspectors.
7. Ensure that necessary operating supplies and furnishings are available to staff personnel.

BASIS OF STAFFING ESTIMATE:

This estimate was based on typical corporate or governmental structures for supporting an organization of the size envisioned.

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Administrative Directorate **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Manager	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	6	11,424 Hr	$38.49	$439,758	$80,068
Pro Staff	28	53,312 Hr	$35.25	$1,879,171	$73,317
Tech/Clerical	30	57,120 Hr	$22.99	$1,312,964	$47,811
Direct Labor (DL) Total	65	123,760 Hr	$29.96	$3,708,419	
Labor Burden					
Cost of Living All		$3,708,419	15.0%	$556,263	
Housing Allow		$3,708,419	60.0%	$2,225,051	
Depend School Allow		65 Emps	$10,000 per Emp	$650,000	
Employ Benefits		$3,708,419	30.0%	$1,112,526	
Labor Burden (LB) Total				$4,543,840	
DL/LB Total				$8,252,259	
Other Direct Costs (ODCs)					
Travel		35 People	$15,000	$525,000	
Supplies		$3,708,419	5.0%	$185,421	
Equipment				$0	
Misc		$3,708,419	1.5%	$55,626	
ODC Total				$766,047	
DL/LB/ODC Total				$9,018,306	
Escalation		$9,018,306	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		123,760 Hr	$72.87	$9,018,306	

6.3.7 COMPTROLLER DIRECTORATE

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Controller's Office	1	1	2
Finance and Accounting Office	2	4	8
Payroll Office	1	2	4
Budget Office	1	3	2
TOTAL	**5**	**10**	**16**

MAJOR FUNCTION(S): To ensure that all financial obligations (contributions) are met by the States Parties as well as oversee the financial operations of the Technical Secretariat.

ACTIVITIES:

1. Pay employees.
2. Prepare and manage the budget of the Technical Secretariat.
3. Coordinate and manage all capital outlays.

BASIS OF STAFFING ESTIMATE:

It was assumed that the Comptroller Directorate will be highly automated, using the latest computer and accounting technology and also based on a typical corporate structure for staffing.

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Comptroller Directorate **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Manager	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	4	7,616 Hr	$38.49	$293,172	$80,068
Pro Staff	10	19,040 Hr	$36.00	$685,486	$74,885
Technical/Clerical	16	30,464 Hr	$18.36	$559,234	$38,183
Direct Labor (DL) Total	31	59,024 Hr	$27.35	$1,614,418	
Labor Burden					
Cost of Living All		$1,614,418	15.0%	$242,163	
Housing Allow		$1,614,418	60.0%	$968,651	
Depend School Allow		31 Emps	$10,000 per Emp	$310,000	
Employ Benefits		$1,614,418	30.0%	$484,325	
Labor Burden (LB) Total				$2,005,139	
DL/LB Total				$3,619,557	
Other Direct Costs (ODCs)					
Travel		15 People	$10,000	$150,000	
Supplies		$1,614,418	5.0%	$80,721	
Equipment		$1,614,418	5.0%	$0	
Misc		$1,614,418	1.5%	$24,216	
ODC Total				$254,937	
DL/LB/ODC Total				$3,874,494	
Escalation		$3,874,494	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		59,024 Hr	$65.64	$3,874,494	

6.3.8 INSPECTION DIRECTORATE

	PROJECTED STAFFING*		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Directorate Management Office	1	4	4
Management	20	20	6
CW Stockpiles		48	36
CW Destruction		156	104
CW Former Production		18	8
Permitted, Schedule 1		6	4
Schedule 2		91	39
Schedule 3, CW Capable		30	15
Challenge		30	30
TOTAL	**21**	**403**	**246**

* See Table 6-3 for details of estimation processes.

MAJOR FUNCTION(S): To support the Technical Secretariat in its primary function of conducting inspections.

ACTIVITIES:

1. Perform initial inspection(s) to verify national declarations.
2. Carry out routine, challenge and ad hoc inspections.
3. Prepare in-depth reports on all inspections.

BASIS OF STAFFING ESTIMATE:

The size of the Inspection Directorate was based on the estimates and assumptions presented in Tables 6-5 and 1-1 (refer to Section 1). It was also determined that inspectors would spend eighty (80) inspection days per year in the field performing actual inspections with 100 days total travel time. The remainder of the time would be spent in the office training, preparing for an inspection, or writing up detailed reports on inspections conducted.

A management team was also established to ensure the proper allocation and control of inspection resources commensurate with the type of inspected facility.

Table 6-5

Technical Secretariat Scheduling and Staffing of Inspectors

Inspection Team

Type of Inspection	Number of Sites Inspected Per Year	Duration of Inspection	Number of Teams Required	Professional Staff				Support Staff		
				Military CW	Chemical Engineer	Analytic Chemist	Industrial Auditor	Interpreter	Instrument Technician	Security
CW Weapons Stockpile	41	10 days	6	6	0	2	0	2	2	2
CW Weapons Destruction Facility	41 *	Continuous	13	4	5	2	1	2	2	4
Former CW Production Facility	28	5 days	2	2	5	2	0	2	2	0
Permitted Schedule 1	20	3 days	1	1	3	2	0	2	2	0
Schedule 2 Commercial Facility	200	5 days	13	0	4	2	1	1	2	0
Schedule 3, CW Capable	200 **	3 days	7.5	0	2	1	1	1	1	0
Challenge Inspections	50 **	5 days	3	3	4	2	1	2	2	6
			Total Staff Required	102	157	83.5	36.5	70.5	83.5	82

* Continuous inspector presence is required during munitions destruction operations. Assume that a three-year destruction campaign is required, then approximately one-third of the destruction sites must be continuously manned during the first ten years of treaty operations. Staffing and costing estimates presented in this document assume that thirteen facilities are operated during each year.

** Number of sites inspected per year, not total number of facilities subject to inspection.

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Inspection Directorate **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Director	1	1,904 Hr	$50.92	$96.953	$105,915
Dep Director	1	1,904 Hr	$44.86	$85,417	$93,313
Dept Mgr	6	11,424 Hr	$41.04	$468,856	$85,366
Asst Mgr	13	24,752 Hr	$40.19	$994,840	$83,600
Pro Staff	403	767,312 Hr	$36.76	$28,203,881	$76,454
Tech/Clerical	246	468,384 Hr	$22.99	$10,766,302	$47,811
Direct Labor (DL) Total	670	1,275,680 Hr	$31.84	$40,616,249	
Labor Burden					
Cost of Living All		$40,616,249	15.0%	$6,092,437	
Housing Allow		$40,616,249	60.0%	$24,369,749	
Depend School Allow		670 Emps	$10,000 per Emp	$6,700,000	
Employ Benefits		$40,616,249	30.0%	$12,184,875	
Labor Burden (LB) Total				$49,347,061	
DL/LB Total				$89,963,310	
Other Direct Costs (ODCs)					
Travel		670 People	$50,000	$33,500,000	
Supplies		$40,616,249	5.0%	$2,030,812	
Central Office Equip				$0	
Field Equipment				$0	
Misc		$40,616,249	1.5%	$609,244	
ODC Total				$36,140,056	
DL/LB/ODC Total				$126,103,366	
Escalation		$126,103,366	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		1,275,680 Hr	$98.85	$126,103,366	

6.3.9 INFORMATION SYSTEMS DIRECTORATE

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Directorate Management	1	2	2
Central Computer Center	2	10	8
Office of Language Services	1	20	6
Library	1	6	8
TOTAL	**5**	**38**	**24**

MAJOR FUNCTION(S): Organize and catalog all information collected on inspections as well as provide information services to States Parties.

ACTIVITIES:

1. Establish a central computer center and a distributed micro-computer network for dissemination of information on declarations and inspections.
2. Provide translation capability for all stored documents and a multi-lingual access to electronic and hard copy materials.
3. Establish a library of information on all aspects of chemical warfare (hard copy - archive) as well as a cross reference filing system.
4. Collect, organize and integrate data from multiple sources.
5. Provide periodic and ad hoc reporting to support inspection activities and member States, including development of measures of treaty effectiveness.
6. Maintain informational archives to support current and future Technical Secretariat functions.
7. Provide assurance that treaty provisions are being complied with by analyzing the data contained in the national declarations and obtained from other sources.
8. Develop and maintain an international communications system supporting the Technical Secretariat.

BASIS OF STAFFING ESTIMATE:

It was assumed that this Directorate would be a highly automated operation using the latest computer technology. Computer operations and other services will support the entire Technical Secretariat and especially the Inspection Directorate.

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Information Systems Directorate **Base Year - FY 1991**

Direct Labor	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Manager	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	4	7,616 Hr	$38.49	$293,172	$80,068
Pro Staff	38	72,352 Hr	$35.25	$2,550,304	$73,317
Technical/Clerical	24	45,696 Hr	$18.36	$838,851	$38,183
Direct Labor (DL) Total	67	127,568 Hr	$29.47	$3,758,853	
Labor Burden					
Cost of Living All		$3,758,853	15.0%	$563,828	
Housing Allow		$3,758,853	60.0%	$2,255,312	
Depend School Allow		67 Emps	$10,000 per Emp	$670,000	
Employ Benefits		$3,758,853	30.0%	$1,127,656	
Labor Burden (LB) Total				$4,616,796	
DL/LB Total				$8,375,649	
Other Direct Costs (ODCs)					
Travel		43 People	$20,000	$860,000	
Supplies		$3,758,853	5.0%	$187,943	
Lib/Ref/Mat				$500,000	
Misc		$3,758,853	1.5%	$56,383	
ODC Total				$1,604,325	
DL/LB/ODC Total				$9,979,974	
Escalation		$9,979,974	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		127,568 Hr	$78.23	$9,979,974	

6.3.10 TECHNICAL SYSTEMS DIRECTORATE

	PROJECTED STAFFING		
	MANAGER	PROFESSIONAL STAFF	TECHNICAL/ CLERICAL
Directorate Management	1	3	2
Analytical Laboratory	2	26	26
Equipment Division	2	18	25
Training Division	2	20	10
TOTAL	**7**	**67**	**63**

MAJOR FUNCTION(S): Provide analytic chemistry services and support to the Inspections Directorate.

ACTIVITIES:

1. Maintain capability to reliably analyze any samples collected by inspectors.
2. Create and distribute testing and analytic standards and provide quality assurance of participating laboratories.
3. Develop and validate standard methods of sampling.
4. Test, calibrate and develop (as necessary) equipment to be used on inspections.
5. Refine inspection procedures and train inspectors.

BASIS OF STAFFING ESTIMATE:

The Analytic Laboratory is staffed to allow operation of state-of-the-art automatic analytic instrumentation. It will develop procedures for testing and assure that these procedures are used in the participating laboratories. It is not anticipated that the Analytic Laboratory will analyze all samples generated by the inspectors but rather assist participating laboratories in analyzing this workload. However, they will perform some analysis on samples collected by inspectors.

The Equipment Division will test and evaluate proposed equipment as well as upgrades to existing equipment. It will also certify the equipment used by the inspectors. We anticipate that proposals for specific equipment will come from

the various States Parties and extensive research and development will not be carried out by the Technical Secretariat.

The Training Division will be responsible for generating all curricula materials as well as training the instructors and inspectors to ensure uniform inspection procedures. This will involve initial, follow-on and refresher training in all types of inspections; i.e., storage, production, destruction and commercial chemical facilities. They would also be responsible for ensuring that these established procedures are followed in the field by observing randomly selected inspections. Training will be a continuous activity for the Technical Secretariat; a heavy emphasis on training will occur during the preparatory period and the initial year of CWC operations.

The Technical Secretariat Project

Technical Systems Directorate **Base Year - FY 1991**

	MP	Hours/Base	Rates ($)	Total	2,080hr/yr Annual Salary
Direct Labor					
Manager	1	1,904 Hr	$40.19	$76,526	$83,600
Asst Mgr	6	11,424 Hr	$38.49	$439,758	$80,068
Pro Staff	67	127,568 Hr	$35.25	$4,496,588	$73,317
Tech/Clerical	63	119,952 Hr	$18.36	$2,201,984	$38,183
Direct Labor (DL) Total	137	260,848 Hr	$27.66	$7,214,856	
Labor Burden					
Cost of Living All		$7,214,856	15.0%	$1,082,228	
Housing Allow		$7,214,856	60.0%	$4,328,914	
Depend Schooi Allow		137 Emps	$10,000 per Emp	$1,370,000	
Employ Benefits		$7,214,856	30.0%	$2,164,457	
Labor Burden (LB) Total				$8,945,599	
DL/LB Total				$16,160,456	
Other Direct Costs (ODCs)					
Travel		74 People	$20,000	$1,480,000	
Supplies		$7,214,856	5.0%	$360,743	
Equipment				$0	
Misc		$7,214,856	1.5%	$108,223	
ODC Total				$1,948,966	
DL/LB/ODC Total				$18,109,421	
Escalation		$18,109,421	0.0%	$0	
Foreign Currency Flux		$0	0.0%	$0	
Total		260,848 Hr	$69.43	$18,109,421	

6.3.11 ORGANIZATIONAL STAFFING SUMMARY

Table 6-6 summarizes the staffing estimates presented in this section. The majority of the staff are expected to be associated with, and directly participate in, the on-site inspection program specified by the CWC. Personnel associated with the other functional areas will be assigned to the Technical Secretariate headquarters. The extent to which headquarters personnel may be used to support the inspection function, and vice versa, has not been considered, although it should be noted that many of the same skills and experience are required in various inspection, technical, and administrative assignments.

Two major uncertainties affect the CWC staffing estimates at this time:

- the exact number of facilities which will be subject to monitoring and inspection and
- the definition of specific on-site inspection procedures (team size, duration, frequency, etc.).

Table 6-6

Technical Secretariat Staffing Summary

	Projected Staffing		
	Manager	Professional Staff	Technical/ Clerical
Executive Office	5	12	11
Scientific Advisory Board	1	3	5
Security	4	20	31
Inspector General	6	23	8
Administrative Directorate	7	28	30
Comptroller Directorate	5	10	16
Inspections Directorate	21	403	246
Information Systems Directorate	5	38	24
Technical Systems Directorate	7	67	63
TOTAL	**61**	**604**	**434**

Staffing estimates should be revised and refined as the treaty approaches finalization and as more information becomes available concerning the number and location of CW storage and production facilities and especially commercial chemical manufacturing facilities.

The Technical Secretariat Project

Summary Table — **Base Year - FY 1991**

	MP	Hours/Base	Rates ($)	Total
Direct Labor				
Inspection Dir	670	1,275,680 Hr	$31.84	$40,616,249
Executive Office	28	53,312 Hr	$33.30	$1,775,368
Tech Sys Dir	137	260,848 Hr	$27.66	$7,214,856
Security	55	104,720 Hr	$20.79	$2,176,675
Info Sys Dir	67	127,568 Hr	$29.47	$3,758,853
Ins Gen Mgmt	37	70,448 Hr	$32.17	$2,266,213
Scentific Advisory Board	9	17,136 Hr	$29.21	$500,526
Comptroller Dir	31	59,024 Hr	$27.35	$1,614,418
Admin Dir	65	123,760 Hr	$29.96	$3,708,419
Direct Labor (DL) Total	1,099	2,092,496 Hr	$30.41	$63,631,577
Labor Burden				
Cost of Living All		$63,631,577	15.0%	$9,544,737
Housing Allow		$63,631,577	60.0%	$38,178,946
Depend School Allow		1,099 Emps	$10,000 per Emp	$10,990,000
Employ Benefits		$63,631,577	30.0%	$19,089,473
Labor Burden (LB) Total				$77,803,156
DL/LB Total				$141,434,734
Other Direct Costs (ODCs)				
Travel				$37,655,000
Supplies		$63,631,577	5.0%	$3,181,578
Central Office Equip				$0
Field Equipment				$0
Lib/Ref/Mat				$500,000
Misc		$63,631,577	1.5%	$954,474
ODC Total				$42,291,052
DL/LB/ODC Total				$183,725,785
Escalation		$183,725,785	0.0%	$0
Foreign Currency Flux		$0	0.0%	$0
Total		2,092,496 Hr	$87.80	$183,725,785

7. FURTHER WORK REQUIRED

While this study, and the other studies mentioned, provide initial estimates of the costs associated with CWC implementation, all assumptions and estimating factors need to be refined and validated.

Changes in the CWC "Rolling Text" that effect either the type or scope of inspections required or the numbers of facilities to be inspected will, of course, change the estimate of Technical Secretariat costs. Especially important will be the ultimate definition of facilities covered in the area of Schedule 3 chemical production, CW capable facilities, and the procedures specified for ad hoc and challenge inspections. As the CWC approaches Entry into Force, the above factors, and others, will have to be carefully evaluated to refine cost and staffing estimates.

The following paragraphs highlight some of the major areas of uncertainty which require further definition and analysis.

7.1 STATES PARTIES. Each signatory to the CWC will be required to designate or create an organization to act as the national point of contact to the CWC organization and to carry out the mandatory actions for each State Party. Each State Party will be expected to carry out the responsibilities enumerated in Section 4, such as:

1. Collect, verify and maintain information related to facilities subject to monitoring and/or inspection under the CWC.

2. Prepare and submit the initial and annual declarations required under the CWC.

3. Support declared facilities in preparing for and responding to internal inspections.

4. Respond to requests for information and/or assistance issued by the international Technical Secretariat.

5. Provide escorts for all inspections carried out on its territory.

6. Assign representatives to mediate between the inspection teams and the inspected facilities.

Staffing and equipment (especially communications and computing equipment) will be required to carry out these responsibilities. The size of the staff will depend on the number and type of facilities in each country as well as the number of challenge (or ad hoc) inspections occurring. This organization must be operational well before the Entry into Force of the CWC to allow for timely submission of the required initial declarations. The cost of the above functions

must be considered and borne by each State Party in addition to a proportionate share of the Technical Secretariat.

7.2 TIME-PHASED ACTIVITIES AND COSTS. The rolling text (CD/1046) specifies the timing of various actions which must be taken by State Parties and the Technical Secretariat following Entry into Force. The budget for the Technical Secretariat must consider the scheduling and time-phasing of activities: start-up, capital expenditures, initial facility inspections, and continuing and/or follow-up inspections. The number of facilities requiring on-site inspection will vary over time and will be influenced by the following factors:

1. Construction, operation and closure of CW destruction facilities,
2. Removal of CW production facilities,
3. New State Parties to the CWC, and
4. Changes and expansions in the commercial chemical industry.

The establishment of a time-phased budget for the Technical Secretariat will require early and continuing attention to these factors by the Preparatory Commission. An accurate model, estimating costs over several years, will be required to assure that CWC needs are fully considered and that these costs are budgeted and funded in a timely manner.

7.3 PREPARATORY COMMISSION. Considerable effort must be expended during the period prior to CWC Entry into Force if the Technical Secretariat is to begin immediately to perform its verification role. A preliminary estimate of Preparatory Commission costs was presented in Section 6.3.1. The work of the Preparatory Commission needs to be carefully defined and mechanisms established to budget for and fund the necessary activities. Among these activities which must be carried out are:

1. Establishing organizational and staffing guidelines for the Technical Secretariat,
2. Specifying and procuring capital equipment,
3. Recruiting and certifying staff,
4. Developing budget proposals for the Technical Secretariat,
5. Defining and developing training programs for the Technical Secretariat,
6. Preparing formats for required national declarations, and
7. Organizing communication and liaison with participating State Parties and their National Authorities.

The work of the Preparatory Commission may extend over several years and must be defined, funded, and completed if effective, early implementation of the CWC is to be assured.

7.4 TECHNICAL SECRETARIAT FUNCTIONS. While this document attempts to define the organization and staffing of the Technical Secretariat, several specific functions have not been considered. Among the functions not currently considered are:

1. Medical support, especially in the area of immunizations and unique health care requirements of the inspection work force,

2. Motor pool equipment and staffing,

3. Travel and logistics support (although a travel office has been proposed, more work is necessary to define this function),

4. Relocation costs for Technical Secretariat Personnel,

5. Equipment specification, procurement, testing and maintenance (again some consideration has been given but more analysis is required), and

6. Regional offices to the inspectorate may result in reduced travel costs at the expense of increased organizational complexity; detailed trade-off analyses are required to define the most efficient, cost-effective, structure.

8 SWEDISH PROPOSAL

8.1 IDENTIFICATION OF THE PROBLEM

On 4 February 1991, Sweden presented a paper to the CD outlining a simplified approach to the problems encountered by the ad hoc committee as to the scope and objectives of verification measures in the chemical industry under Article VI of the draft convention (CD/1046).

As previously discussed in paragraph 2.3 ff., an elaborate verification system for facilities that produce, process or consume Schedule 2 chemicals above one ton/year (as yet not agreed to) has been devised in order to ensure compliance and enhance confidence. This approach is similar to the controls of fissionable materials under IAEA safeguards.

The Swedish paper takes exception to basing a verification system on material balances due to the complex nature of the chemical industry. Furthermore, Schedule 2 and 3 producers, in quantities other than those authorized; those having the capability to produce scheduled chemicals; and national transfers are left undeclared and unmonitored. Lastly, only a small portion of a multi-use facility may be declared when, in reality, several production areas within that facility may be chemical weapons capable.

The Swedish paper contends that the negotiation of facilities agreements, Annex 2 to Article VI, would require an average of 50 to 100 man-days per facility. With approximately 1,000 facilities world w , this would require 50,000 to 100,000 man-days for this effort alone, prior to actual inspections. If multi-use plants modified their production processes, the agreements might have to be renegotiated. Thus, the Technical Secretariat would be under a tremendous administrative and financial burden without taking into account the responsibilities under Articles IV, V and VI.

8.2 PROVISIONS OF THE SWEDISH PROPOSAL

8.2.1 Suggested Alternatives:

a. Verification protocols would be based on a qualitative approach under a single system of declaration. All facilities that produce Schedule 2 and 3 chemicals as well as those capable of producing listed chemicals would be declared annually.

b. An annual declaration (planned activities) would consist of planned activities (i.e., production level, duration of production, etc.) for each site for the coming year (above [TBD] threshold) and chemical production capability identified

by conversion processes (above [TBD] threshold). This latter category of facility would belong to a suggested Schedule 4 and from here on shall be referred to as such. The suggested process definitions are contained in Appendix B.

c. All declared facilities are subject to inspection on short notice.

d. Inspections will verify that ongoing activities are in accordance with the declarations and the absence of non-declared activities.

e. All declared facilities producing Schedule 2 or 3 chemicals shall be inspected within [TBD] months.

f. States parties shall participate in the selection of inspection targets.

g. An annual declaration (past activities) will include quantities produced, imported and exported; and significant deviations from the declaration of planned activities.

8.2.2 Proposed System:

a. The definition of "facility" to mean the entire plant site (as per CD/984) not just a portion of it.

b. *Declaration of* planned activities shall include:

- producers of schedule 2 or 3 chemicals in a quantity above [TBD] threshold;
- producers of any other discrete chemical by means of a specifically identified conversion process, Schedule 4;
- the submission of type of chemical, amount, and time for production of a Schedule 2 or 3 chemical three months in advance of the calendar year;
- production of other discrete chemicals above [TBD] threshold by the use of identified chemical conversion processes (no specifics required), if no production of schedule chemicals is anticipated;
- reporting of unplanned production of a Schedule 2 or 3 chemical to be reported to the Technical Secretariat before initiation of that production; and
- declaration of production start-up, using an identified conversion process at an undeclared plant site, is deferred to the next annual declaration.

c. Declaration of past activities within three months after the end of the calendar year will include:

- quantities produced, exported, and imported of each Schedule 2 and 3 chemical, and the country and quantity involved;
- production of each schedule 2 and 3 chemical that is above [TBD]% of the annual declaration; and
- modification to the list of facilities on Schedule 4 with an output above [TBD] threshold.

d. Inspections shall be conducted:

- on-site and on short notice;
- to verify the activities are in accordance with the declaration and that there is no Schedule 1 chemicals, or Schedule 2 and 3 non-declared production;
- to establish that no activity is taking place that should have been declared;
- to inspect any production plant within the declared facility; and
- to establish general provisions for the conduct of an inspection.

e. Selection:

- Each Schedule 2 or 3 chemical producing facility will receive one inspection within [TBD] after notifying the Technical Secretariat.
- Each State Party can propose a maximum of ten and a minimum of one inspection annually to the Technical Secretariat. The Technical Secretariat will randomly select the facilities to be inspected from that suggested list. The number of facilities inspected will not exceed but can be equal to the number of requests for inspections. No facility will be inspected more than twice during a calendar year.
- A random selection of facilities may also be made by the Technical Secretariat among all the declared facilities to maintain an agreed number of inspections annually.

f. Each National Authority will be responsible to the Technical Secretariat for its declaration information.

g. Confidential business information will remain inside the plant site.

Table 8-1. shows the inspection objectives for inspection verification according to the Swedish proposal.

Figure 8-1. shows the projected schedule for the Technical Secretariat in order to meet these verification requirements. In order to develop this timeline, certain assumptions had to be made and are as follows:

[1] This proposal continuously referred to "calendar year". We structured the inspection regime in the same timeframe; i.e., January through December. Therefore, requests for site inspections would have to be made by States Parties to the Technical Secretariat by November to allow for initial scheduling of the inspections.

[2] Since the paper distinguished between "one mandatory inspection of all facilities within [TBD] after notifying the TS" and "requested inspections by States Parties" we assumed that they were not only meant to be considered separately but may be conducted in a different manner. Since the number of these required inspections during the first year of the treaty would be extremely high, a two-year cycle was used; only one-half of these sites would be inspected during the first year. Depending on the number of signatories and the number of Schedule 2 and 3 facilities, a three or even four year cycle may be necessary.

Table 8-1

SWEDISH PROPOSAL FOR INSPECTION VERIFICATION

	INSPECTION OBJECTIVE				
INSPECTION SUBJECT	NON-PRODUCTION OF SCHEDULE 1 - I	NO UNDECLARED PRODUCTION - II	NO DIVERSION TO PROHIBITED PURPOSES - III	CONSISTENT WITH DECLARATION	
				QUALITATIVE - IV	QUANTITATIVE - V
SCHED. 2	X	OTHER SCHEDULE 2	PRODUCTION CONSISTANT WITH COMMERCIAL REQUIREMENTS (SALES)	DECLARED MATERIALS/ FEEDSTOCKS	- RATES/ SCHEDULES - MATERIALS BALANCE
SCHED. 3	X	SCHEDULE 2 OR OTHER SCHEDULE 3	SAME	DECLARED MATERIALS/ FEEDSTOCKS	- RATES/ SCHEDULES - MATERIALS BALANCE
SCHED. 4 CW CAPABLE	X	SCHEDULE 2 OR 3	NOT APPLICABLE	PROCESSES/ OPERATIONS	NOT APPLICABLE

INSPECTION TECHNOLOGY:	INSPECTION OBJECTIVE:
1. SAMPLE AND ANALYSIS FOR SPECIFIC COMPOUNDS	I, II, IV
2. VISUAL EXAMINATION	I, II, III, IV
3. RECORDS EXAMINATION	III, V
4. SAMPLE AND ANALYSIS FOR UNKNOWNS	NOT USED
5. ON-SITE MONITORING	NOT USED

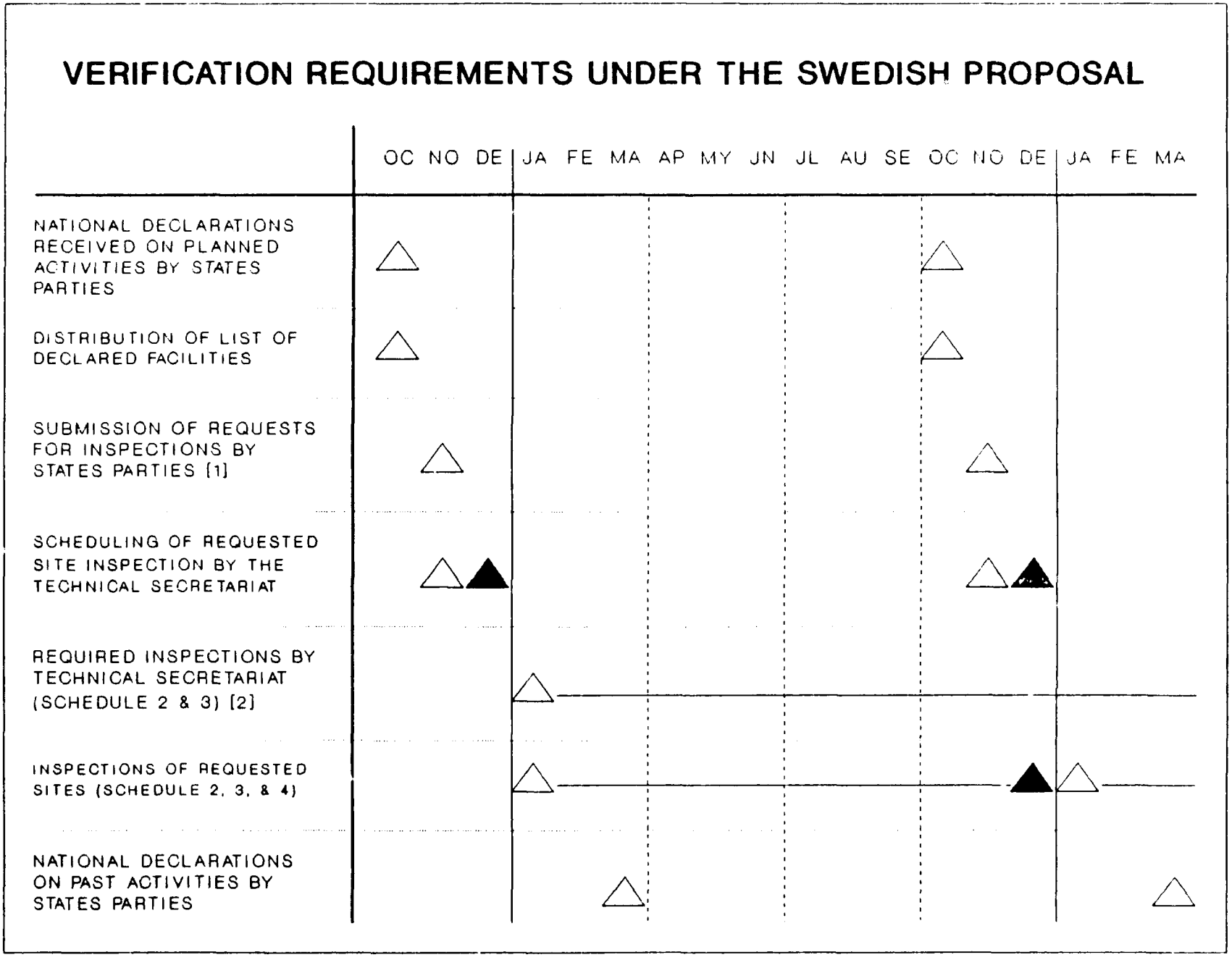

FIGURE 8-1. Time Line for Verification Requirements Under The Swedish Proposal

8.3 ORGANIZATIONAL AND STAFFING IMPLEMENTATION ON REQUIREMENT TO INSPECT

8.3.1 Number and Types of Inspections

The inspections envisioned under the Swedish Proposal, as discussed in paragraph 8.2, would emphasize detection of prohibited activities, Schedule 1 production, and undeclared Schedule 2 and 3 production. Table 8-2. shows the annual number of inspections that the Technical Secretariat would be required to conduct under the Swedish Proposal. Table 8-3. highlights the characteristic differences between inspections under the rolling text and the Swedish Proposal. Less emphases would be given to confirming material balances and the use of feedstock materials than would have been the case under the current CWC rolling text. Given this emphasis, the need for records examinations and industrial auditors on the inspection team would be greatly reduced.

Table 8-4. presents the number of inspectors required under the Swedish proposal while the skills required are shown on Table 8-5.

While more total inspections would be required, both the number of inspectors per team and the duration of the inspection would be reduced under the Swedish Proposal. The National Trail Inspections (NTIs) reported to the CD have consistently cited the records examinations and materials balance as the most time consuming portion of the inspection process at an individual site. By de-emphasizing this aspect of the inspection process, shorter duration inspections using smaller inspection teams could be possible.

8.3.2 Inspection Directorate Staffing

Table 8-6. presents the staffing estimates for the Technical Secretariat's Inspection Directorate.

Staffing the Technical Secretariat, Inspection Directorate, at the level of about 240 staff should be sufficient to allow significant flexibility in adjusting the size and composition of inspection teams given the number of duplicate requests anticipated (see Table 8-2.). If a passive quota system is implemented, a further reduction in the number of inspections actually conducted would be anticipated. Allowing three, rather than two, years to complete the initial inspections of Schedule 2 and 3 production facilities would reduce the number of inspection staff required from 240 to about 225.

The above considerations apply to the staff size required for the initial two to three years of the Technical Secretariat operation. After the initial

Table 8-2

Annual Number of Inspections Required Under Swedish Proposal

	Number of Facilities	Number of Inspections
Technical Secretariat Scheduled Inspections (Schedule 2 and 3)	800 [1]	400 [2]
Requested Inspections (Assume 120 States Parties)	5,000	1,200 [3]
TOTAL		1,600

[1] Assumes 800 declared Schedule 2 and 3 producers, above production threshold.

[2] Initial visits to declared Schedule 2 and 3 within 2 years; actual number may be lower than requested inspections.

[3] Duplicate requests and passive inspection quotas would make actual number of inspections less than this maximum number.

Table 8-3

Characteristics of Inspection Under a Unified Industrial Facility Scheme (Swedish Proposal)

Inspection Technique	Application and Emphasis	Inspection Team Specification
Visual Inspection	Very Important; verify capability/ capacity declarations; detect suspicious activity	Experience with variety of industrial chemical processes/ facilities
Samplin/Chemical Analysis	Very important; test for prescence (qualitative) of Schedule 1 chemicals or undeclared Schedule 2 or 3; waste and area samples most important	Experience with environmental sampling (soil, liquid, air); specification of industrial samples; on-site analysis
Records	Minor importance; provides qualitative validation of declaration	Sampling of records (product sales; material receipts) Material balance not significant under this regime
On-site Monitoring Equipment	Not used	None (staff and equipment)

Table 8-4

Number of Inspectors Required Under the Swedish Proposal

Inspection Team Size	Duration of Inspections (Days)	Inspector Days/ Inspection	Total Inspector Days	Number of Inspections*
6	2	12	19,200	240
12	4	48	76,800	960

* Each inspector would provide 80 days of inspections per year with the remaining time occupied in training, preparing for and reporting on inspections, and travel.

Table 8-5

Type Inspectors Required to Implement the Swedish Proposal for Industrial Facilities

TECHNICAL STAFF				SUPPORTING STAFF		
Team Leaders	Chemical Engineer	Chemical Weapons Experts	Analytical Chemist	Sampling Technicians	Security/ Communications	Total Inspector Work Force
40	80		40	40	40	240

Table 8-6

Inspection Directorate; Swedish Proposal

	Projected Staffing		
	Manager	Professional Staff	Technical/Clerical (Support)
Directorate Management Office	1	4	4
Management	20	20	6
CW Stockpiles		48	36
CW Destruction		156	104
CW Former Production		18	8
Permitted, Schedule 1		6	4
Unified Industrial Inspections		160	80
Challenge		30	30
TOTAL	21	442	239

inspections of Schedule 2 and 3 production facilities, the required number of inspection personnel might be reduced by as much as 20% to 25%. However, the need to reinspect facilities together with continuous changes in the world-wide industrial chemical production base would argue for a relatively constant inspector work force.

The number of inspectors required under the Swedish Proposal, about 250, is almost identical to the estimate prepared for the rolling text. This assumes that approximately 500 Schedule 3 or ad hoc inspections would be conducted annually. While many more inspections would be conducted annually, 700 verses 1,400 under the Swedish Proposal, the combination of a smaller inspection team and a shorter duration of inspections would require the same number of inspection personnel.

8.3.3 Variations in Staffing

The staffing levels presented above represent an internally consistent estimate of the inspection effort required under the Swedish Proposal. Because the number of requests allowed and the number of States Parties are fixed, the number of inspections seem relatively well established. However, both the size of the inspection team and the duration of the inspection are subject to considerable uncertainty. Table 8-4. illustrates the range of Inspection Directorate staff size required under differing assumptions regarding inspection protocols.

The lower estimate, adopted in this study, seems consistent with the limited character of the on-site inspection required to verify that prohibited and non-declared activities are not being conducted at an industrial site. Should negotiations determine that a larger inspection team size or longer on-site presence are required, the staffing and costing estimates must be adjusted.

8.3.4 Equipment

Since detection of prohibited, or undeclared, chemicals is a major feature of the inspection process under the Swedish Proposal, an inspection emphasis will be the collection and chemical analysis of samples. To reduce intrusiveness and minimize the potential loss of confidential business information, the analysis of samples at the inspection site is preferred.

Each inspection team should be equipped with a sensitive analytic instrument, preferably a gas chromatograph-mass spectrograph, calibrated to reliably detect Schedule 1, 2 and 3 chemicals. Analysis of unknown chemicals is not required and, for the sake of minimizing intrusiveness, undesirable. Each inspection team would require a portable analytic instrument and sample collection equipment for air, liquid and soil samples. Assuming that the instrument and associated sampling

equipment cost approximately $150,000, the industrial sampling would require simultaneous fielding of about 15 teams for an equipment cost of $2.3 million. This figure is roughly equivalent to the equipment costs estimated for the function (industrial inspection) under the rolling text.

8.4 COST OF IMPLEMENTING THE SWEDISH PROPOSAL

Based on the above discussions, the Technical Secretariat costs for implementation of the Swedish Proposal can be estimated. While twice as many inspections (700 verses 1,400) of industrial facilities would be conducted under the Swedish Proposal, the reduction in both inspection team size and duration of inspection lead to an estimate of inspection staffing almost exactly the same as the size in the rolling text. Using the same assumptions regarding the number of inspection days delivered by the inspector, 80 days per year, and the cost of travel and subsistence, there will be no significant cost difference between the two inspection protocols.

If the size of the Inspection Directorate is unchanged, the other Technical Secretariat functions should also be staffed and funded at approximately the same level. Therefore, based on the estimates and assumptions presented in this Section, the annual cost of operating the Technical Secretariat under either industrial inspection regime would be approximately equal. No significant changes, increases or decreases, in equipment operating costs should be anticipated. While more extensive (and expensive) field equipment might be required under the Swedish Proposal, these additional costs would be counterbalanced by lower costs in central (or regional) laboratories.

Therefore, the decision to adopt one of the inspection protocols should be based on considerations of confidence or intrusiveness, not cost.

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Therefore, the decision to adopt one of the inspection protocols should be based on considerations of confidence or intrusiveness, not cost.

8.5 SUMMARY DISCUSSION

8.5.1 Comparison to the Rolling Text:

	SWEDISH PROPOSAL	ROLLING TEXT
DECLARATIONS:		
INITIAL	* All Schedule 2 and 3 with information on Schedule 4 (consumers not included)	* All Schedule 2 and 3; producers, processors, and consumers for past 3 years * Submitted 30 days after Entry into Force
ANNUAL	* Quantities produced, exported, and imported; Schedule 2 and 3 * Deviation from declaration	* Quantities produced, processed, consumed, exported, and imported; Schedule 2 and 3 (more details if > 1 ton, Schedule 2 and > 30 tons, Schedule 3 in previous year * Final product/end use; Schedule 3
PLANNED ACTIVITIES	* Annual; all Schedule 2, 3, and 4 producers * Provided 3 months prior to production of Schedule 2 or 3 if not in annual declaration * Any use of conversion processes for discrete chemicals above a [TBD] threshold	* Annual; all Schedule 2 producers and Schedule 3 if > 30 tons * Provided [TBD] months prior to operation or change
PAST ACTIVITIES	* Annual; Schedule 2 and 3 with information on Schedule 4 * Provided 3 months after calendar year	* Annual; Schedule 2 and 3 * [TBD] months after the end of the year
NATIONAL TRANSFERS	* Some reporting on Schedule 2 and 3	* Done under annual declaration
REVISION OF DECLARATION	* Annual; activities during past year * Provided 3 months after the end of the year	* Annual; activities during past year * Provided [TBD] months before any change takes place
TYPES OF INSPECTIONS:		
SELECTION PROCESS	* Random by Technical Secretariat, selection by States Parties	* Depends on the type of inspection
INITIAL	* None; substitute "required" * Schedule 2 and 3	* Negotiate facilities agreements * Verify information on Schedule 1 and 2 facilities

ROUTINE	* None	* Schedule 2 and 3; schedule not determined
AD HOC	* None	* Schedule 2 and 3
REQUESTED	* Schedule 2, 3, and 4 by States Parties	* None
REQUIRED	* Schedule 2 and 3; once by Technical Secretariat	* Periodic Schedule 2
CONDUCT OF INSPECTIONS:		
AVERAGE DURATION	* 1 to 2 days	* 3 to 5 days
ANNUAL NUMBER OF INSPECTIONS	* All Schedule 2 and 3 with a fixed period; requested inspections (maximum of ten times the number of signatories)	* All declared Schedule 2 facilities and some Schedule 3 under ad hoc regime
INSPECTION PERSONNEL	* 240	* 250
FACILITY	* Total facility; plant site	* Only declared production unit
NOTIFICATION	* Short (timeframe not defined)	* Timeframe for each type varies
SAMPLING/ ANALYSIS	* All done on site	* Some samples removed
INTRUSIVENESS	* Potentially high	* Could be high (no control over analysis done off-site)
DATA COLLECTION	* Not removed from site	* Extensive data maintained at the Technical Secretariat
MATERIAL BALANCE	* None (or minor)	* Extensive
MONITORING	* None	* Possible at Schedule 2 facilities
ON-SITE PRESENCE	* None	* None

An effort was made not to interject too many assumptions into each document but to take both documents at face value. The rolling text has undergone considerable discussion, revision and refinement which has not been the case with the Swedish Proposal.

An effective, viable chemical weapons treaty for commercial facilities must be based on three primary dimensions: confidence, intrusiveness and cost. All three impact each other and must be balanced to provide the maximum confidence level with the minimum amount of intrusiveness at the optimum cost.

CONFIDENCE: What is an acceptable level of confidence? Do the procedures provide this level? The required level of confidence must be decided by each State Party and is dependent on geographical location and threat assessment. Each State Party must establish their minimum acceptable level of confidence such that the production of a militarily significant amount of chemical munitions could not be produced or stockpiled, undetected, and that detection would occur in sufficient time to react to that threat.

INTRUSIVENESS: To what extent is private industry going to permit inspections that could put confidential business information at severe risk? Once on site, would inspectors succumb to temptations to provide CBI to competitors? Private companies may balk at the idea of allowing inspectors, especially foreign inspectors, unrestricted access to the entire plant site. Similarly, CWC inspections of military activities may pose a risk compromising national security information unrelated to chemical weapons. Consistency of CWC inspections with the provisions of national and international law must be considered.

COST: How much can a country afford to spend? Alternately, can they not afford to spend the money to get rid of chemical weapons? How much is enough?
Each country will have to put into perspective these three factors to determine what is the proper balance among them. Some signatories may accept a lower level of confidence because their threat assessment is low. They may have to accept it if they do not have the funds to support a higher level. If confidence is low that a violation will be deterred and, if not deterred, detected, then it is not worth signature even if it is free. What is the proper balance among the factors?

8.5.2 Problems and Concerns:

a. Limiting to twice-a-year inspections. There could be collusion for the purpose of conducting undetected, subversive activities. Two countries could collaborate to have a site in a third country inspected during two consecutive months. This would eliminate that site from inspection for ten months, during which time prohibited activities could be conducted without fear of an international inspection.

b. Cost. According to the Swedish paper, all Schedule 2 and 3

facilities would receive one required inspection within a specified (but undefined) period of time. If a baseline facilities agreement is developed, to be modified for site specific peculiarities, it would not be any more time consuming than inspecting all Schedule 2 and 3 facilities.

c. Scope. If "facility" is to include the entire plant site rather than the declared "process unit", the inspection could potentially be much more intrusive than under the rolling text definition and also put confidential business information (CBI) at risk. This would have a significant impact on smaller facilities.

d. Intrusiveness. This could be a violation under our Fourth Amendment safeguards.

e. No Facilities Agreements. There will need to be certain "ground rules" established for the inspection of commercial facilities in order to elicit their full cooperation. It does not seem plausible to expect a commercial enterprise to willingly allow unrestricted access to its facility. It would seem, therefore, that a generic agreement should be incorporated as part of the Convention and associated protocols.

8.6 RECOMMENDATIONS TO AMEND OR CLARIFY THE SWEDISH PROPOSAL

8.6.1 Raise the number of requests to at least twelve (12) and allowing three per quarter for each State Party.

RATIONAL: This would provide for a changing world situation as well as respond to the dynamic chemical manufacturing community. It would also provide for a more even distribution of inspections during the year. A State Party would not have to commit to all of its requests at the beginning of the year. Given the complexities and fluidity of the chemical industry, production is not constant. In this way, the additional requirement could be placed on the regime to have a requested site visited within six months; i.e., sites requested in the first quarter would be inspected in the second quarter, sites requested in the second quarter would be inspected in the third quarter, etc. It would preclude a State Party from waiting for possibly as long as a year before having a requested site inspected and thus provide for a more expeditious interval between the request date and inspection date (See Figure 8-2.). This Figure is similar to the one in paragraph 8.2.2 of this section with a few recommended revisions.

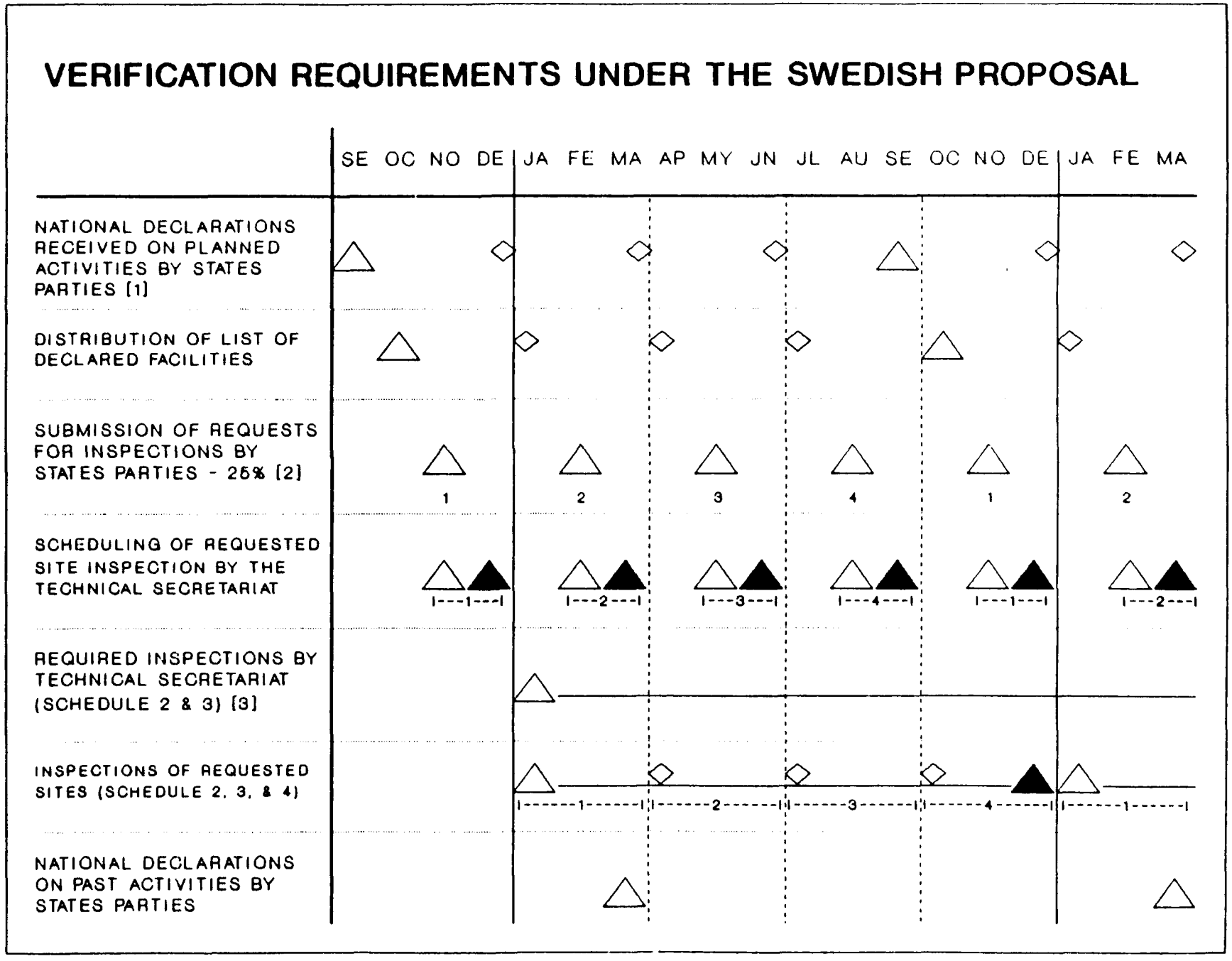

Figure 8-2. Suggested Revision of Time Line for Verification Requirements Under the Swedish Proposal

[1] National declarations would have to be made at least by September of the previous calendar year in order to provide enough time to distribute the list to all States Parties. (Six months prior to the calendar year would be preferable.) Two months prior to the beginning of each quarter, this list would be revised to include any updated information provided by the States Parties and distributed.

[2] States Parties would be required to submit their requests to the Technical Secretariat no later than 30 days prior to the beginning of the quarter and then, only 25% of their quota. If submissions are not received by that date the State Party would lose their request for that quarter.

[3] This system would allow for better scheduling of the required inspections, as well as personnel, since only 25% of the requests would have to be considered in at any one time.

8.6.2 Establish a regime for passive quotas.

RATIONAL: Under the provisions established in the Swedish proposal, a given country could receive the preponderance of inspections, overburdening not only the National Authority but also that agency assigned escort and ancillary duties. This may need to be refined in some manner; i.e., a percentage of declared facilities, or some other means; such that the industrialized countries with more chemical production capable sites receive more inspections.

The Swedish Proposal establishes ten inspection requests per year which may be made by each State Party. Considering equity and the desire to ensure satisfactory geographic and political coverage, a system of passive quotas may also be required. The form of the passive quota statement would be, "No State Party is obligated to receive more than [TBD] inspections per calendar year on facilities located on its national territory."

The numeric quotas should be established with consideration given to the number of facilities; i.e., Schedule 2, 3, and 4. An illustration of a possible assignment of quotas is shown on Table 8-7.

Both the category definitions and the size of the passive quotas can be adjusted to assure equity and also to fix the number of inspections to be conducted during each annual period. By placing a limit on the number

Table 8-7

Assignment of Passive Quotas

Category	Number of Inspections/ Calendar Year
Major Industrialized Country (greater than $X chemical industry sales)	15
Industrialized Country (greater than $Y but less than $X chemical industry sales)	10
Developing Country (less than $Y chemical industry sales)	5

of inspections, the size and required funding of the Technical Secretariat can be fixed at a level which provides sufficient confidence without excessive cost.

The passive quotas will relate only to inspections occasioned by a request by another State Party. The requirement that all Schedule 2 and 3 production facilities be inspected within a set time period should remain to assure a complete, continued coverage of those plants whose products pose the most danger to the purposes of the Convention.

An appropriately scaled, passive inspection quota combined with the required declaration and other inspection provisions will provide the necessary flexibility of inspections to instill high confidence in a cost-effective manner while preventing undue disruption to the industrial sector of any State Party.

IMPLEMENTATION OF A TREATY BANNING CHEMICAL WEAPONS

APPENDICES

APPENDIX A

SCHEDULE OF CHEMICALS

1. **DEFINITIONS (from CD/1033):**

1.1 Super-Toxic, Lethal Chemicals are those which have a median lethal dose which is $\geq$ 0.5 mg/kg (subcutaneous administration) or 2,000 mg-min/m^3 (by inhalation) when measured by an agreed method set forth in ... (requires further discussion).

1.2 Other Lethal Chemicals are those which have a median lethal dose which is > 0.5 mg/kg (subcutaneous administration) or 2,000 mg-min/m^3 (by inhalation) and $\leq$10 mg/kg (subcutaneous administration) or 20,000 mg-min/m^3 (by inhalation) when measured by an agreed method set forth in ... (requires further discussion).

1.3 Other Harmful Chemicals are those [toxic] chemical not covered by the definitions above, [including toxic chemicals which normally cause temporary incapacitation rather than death] [at similar doses to those at which super-toxic, lethal chemicals cause death] (requires further discussion).

1.4 Key Precursors pose a significant risk to the objectives of the Convention by virtue of their importance in the production of a toxic chemical. They play an important role in determining the toxic properties of a [toxic chemical prohibited by the convention] [super-toxic, lethal chemical]; are used in one of the chemical reactions at the final stage of formation of the [toxic chemical prohibited by the convention] [super-toxic, lethal chemical]; and may not be used or used only in minimal quantities for permitted purposes. They may also be a key component of binary and/or multi-component chemical systems for chemical weapons means... (requires further discussion).

2. SCHEDULES OF CHEMICALS

2.1 Schedule 1 Chemicals: Criteria for chemicals in this category are:

- had been developed, produced, stockpiled or used as a chemical weapon (defined in Article II) or has a high potential for use for activities prohibited by the Convention; and
- has little or no use for purposes not prohibited under the Convention.

a. O-Alkyl ($\leq C_{10}$, including cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates (requires further discussion), such as Sarin and Soman.

b. O-Alkyl ($\leq C_{10}$, including cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocynidates (requires further discussion), such as Tabun.

c. O-Alkyl (H or $\leq C_{10}$, including cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) protonated salts (requires further discussion), such as VX.

d. Sulphur Mustards, such as Mustard Gas (H), Sesquimustard (Q), and O-Mustard (T).

e. Lewisites, such as Lewisite 1, 2, and 3.

f. Nitrogen Mustards, such as HN1, HN2, and HN3.

g. 3-Quinuclidinyl benzilate (BZ) (Extension of this category to include related chemicals will be discussed further.).

h. Saxitoxin (Placing toxins on the Schedule requires further discussion).

i. Ricin (Placing toxins on the Schedule requires further discussion).

j. Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldifluoride, such as DF.

k. O-Alkyl (H or $\leq C_{10}$, including cycloalkyl) O-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonites and corresponding alkylated and protonated salts, such as QL.

l. O-Alkyl (H or $\leq C_{10}$, including cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonochloridates, such as Chloro Sarin and Chloro Soman (requires further discussion).

m. 3,3-Dimethylbutan-2-ol (pinacolyl alcohol) (could be placed on Schedule 2A).

2.2 Schedule 2A Chemicals: Criteria for chemicals in this category are:

- may be used in one of the chemical reactions at the final stage of Schedule 1 chemicals;
- may pose a significant risk to the objectives of the Convention because of its importance in the production of Schedule 1 chemicals; and

• is not produced in large commercial quantities for purposes not prohibited by the Convention (requires further discussion).

a. Chemicals containing a phosphorus atom to which is bonded one methyl, ethyl, or propyl (normal or iso) group but not further carbon atoms, except for those chemicals listed under Schedule 1 (requires further discussion).

b. N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic dihalides.

c. Dialkyl (Me, Et, n-Pr or i-Pr) N,N-dialkyl (Me, Et, n-Pr or i-Pr)-phosphoramidates.

d. Arsenic trichloride

e. 2,2-Diphenyl-2-hydroxyacetic acid (requires further discussion) .

f. Quinuclidin-3-ol (requires further discussion).

g. N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl-2-chloride and corresponding quaternary compounds (requires further discussion).

h. N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-ol and corresponding quaternary compounds (requires further discussion).

i. N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-thiol and corresponding quaternary compounds (requires further discussion).

j. Bis(2-hydroxyethyl)sulphide (thiodiglycol) (requires further discussion).

k. 3,3-Dimethylbutan-2-ol (pinacolyl alcohol) (requires further discussion).

2.3 Schedule 2B Chemicals: These are super-toxic, lethal chemicals and other chemicals which are not included in Schedule 1 and are not precursor chemicals but pose a significant risk to the objectives of the Convention. Further consideration is needed on the whole question of the handling of by-products that pose a risk to the Convention.

a. Amiton (requires further discussion).

2.4 Schedule 3 Chemicals: These are dual purpose chemicals or a precursor chemical that is not listed in other Schedules.

a. Phosgene.

b. Cyanogen chloride.

c. Hydrogen Cyanide.

d. Trichloronitromethane (chloropicrin).

e. Phosphorus oxychloride.

f. Phosphorus trichloride.

g. Phosphorus pentachloride.

h. Trimethyl phosphite
i. Triethyl phosphite
j. Dimethyl phosphite
k. Diethyl phosphite
l. Sulphur monochloride.
m. Sulphur dichloride.
n. Thionyl chloride.

APPENDIX B

SCHEDULE 4, CHEMICAL CONVERSION PROCESSES (AS PROPOSED BY SWEDEN)

1. SCHEDULE 1 CHEMICALS/FAMILIES OF CHEMICALS

Chemical No.*	Chemical Conversion Process
1.	Alkylation (other) Substitution (esterification) Halogenation Oxidation (controlled)
2.	Substitution (esterification and other)
3.	Alkylation (other) Substitution (esterification) Oxidation (controlled)
4.	Alkylation (addition to ethylene or vinyl chloride) Halogenation
5.	Alkylation (addition to acetylene)
6.	Halogenation
7.	Esterification
8.	Not applicable - extraction from natural sources
9.	Not applicable - extraction from natural sources
10.	Alkylation (other) Halogenation Oxidation (controlled)
11.	Alkylation (other) Substitution (esterification)
12.	Alkylation (other) Oxidation (controlled) Substitution (esterification)
13.	Identical to Schedule 2, item 11

*See Schedule of Chemicals, Appendix A.

2. **SCHEDULE 2 PART A CHEMICALS/FAMILIES OF CHEMICALS**

Chemical No.	Chemical Conversion Process
1.	Alkylation (other)
2.	Substitution (other)
3.	Substitution (esterification and other)
4.	Halogenation
5.	Condensation Isomerization Oxidation (controlled)
6.	Alkylation (other) Condensation Esterification Hydrogenation
7.	Halogenation
8.	Alkylation (addition to ethylene oxide)
9.	Substitution (other)
10.	Alkylation (addition to ethylene oxide and other alkylation)
11.	Condensation Hydrogenation Isomerization

3. **SCHEDULE 2 PART B CHEMICALS**

Amiton	Substitution (esterification)
PFIB	Isomerization

4. **SCHEDULE 3 CHEMICALS**

Chemical No.	Chemical Conversion Process
1.	Halogenation
2.	Halogenation
3.	Dehydrogenation
4.	Halogenation
5.	Oxidation (controlled)

6. Halogenation

7. Halogenation

8. Substitution (esterification)

9. Substitution (esterification)

10. Substitution (esterification)

11. Substitution (esterification)

12. Halogenation

13. Halogenation

14. Halogenation